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Letters to the editor are welcomed, and should be sent to the editor,
Environment Views
Alberta Environment,
Communications Branch
12th Floor, Oxbridge Place,
9820 - 106 Street,
Edmonton, Alberta T5K 2J6

Editor:
Maryhelen Vicars
Researcher:
Susan Bramm

Editorial Board:
Jerry Lack, Jim Martin, Dave McCoy, Don Nicol, Ray Rasmussen, Chris Staddon, Stephen Tyler, and Bob Westbury.

The editorial board of *Environment Views* was helped in preparing this issue by Dave Kill, of the Canadian Forest Service; Bruce Dancik, professor of forest science, University of Alberta; Richard Pharis, professor of botany, University of Calgary; Al Brennan, assistant deputy minister of Alberta Energy and Natural Resources responsible for the Alberta Forest Service; and Arden Rytz, director of the Alberta Forest Products Association.

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Editor's Notebook

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GERRY RASMUSSEN

Crisis is a favorite word in the media these days, one in danger of losing its impact through overuse, as in the Energy Crisis; the Crisis in the Middle East; even the Crisis in Widget Production. For that reason, we hesitated to use The Crisis in World Forestry as a title for the second story in this issue.

But crisis it is. The Nepalese example used by writer Gillian Sniatynski ("whole mountainsides denuded of their forest cover and turned by monsoon-triggered landslides into washed-out gullies") is repeated throughout the world. In many parts of the world, particularly in the tropics, once the forest is cleared, the soil deteriorates so quickly that it cannot support forests, agriculture, wildlife — or human life — again.

What has been called the crisis in Canadian forestry in a spate of recent magazine articles and television documentaries pales by comparison. After all, flight over many parts of the country offers views of dense forest, interrupted only here and there by blocks of raw ground or blackened trees. A closer, province-by-province look may dispel complacency, however. Canada has a short forestry history, almost all of it based on exploitation. For years, there was so much timber there didn't seem to be anything wrong with "mining" it; that is, harvesting and moving on, trusting nature to renew the mess left behind.

Now, two or three or four generations later, we're paying the bills. Harvesting has become more and more efficient, outstripping nature's, or man's, ability to renew the resource. The best trees are now found far from markets. Even in Alberta, which has one of the best forest management programs in the country and a still-plentiful supply of both softwood and hardwood, new growth is lagging behind. There are other threats as well, from wildfire, pests, disease and pollution.

But the Alberta forest story is not all doom and gloom. Forestry is a stable and growing source of jobs and revenue. Belatedly, perhaps, we are investing more in fire prevention and protection; in research on pests and disease, tree genetics and reforestation techniques. More money and attention is slowly being spent on renewing the forests. Government and industry are working together on these programs and on others to raise the public consciousness about the importance of forests and conservation, perhaps *before* there is a crisis in Alberta's forest industry.

Maryhelen Vicars, a former journalist, is the freelance editor of *Environment Views*.

Norma Ramage

The Forest Industry in Alberta

"The wood of this area is coarse and worthless, generally suitable only as a very inferior quality of firewood."
(James Hector, Palliser Expedition member, 1857, commenting on the timber of Alberta's Eastern Slopes.)

SUSAN BRUN

It's a lucky thing for Alberta — and Albertans — that Dr. Hector's disparaging comments on the value of the province's timber weren't taken to heart by the people who pioneered our forest industry.

If the good doctor were alive today, imagine his chagrin at discovering that this "inferior" wood was now the basis of a business that provides 16,000 jobs in Alberta, and is the second-largest employer in the province after the food and beverage industry.

With the fourth largest industry in Canada — behind British Columbia, Ontario and Quebec — Alberta processes over 7 million cubic metres of coniferous and deciduous logs annually, representing $815 million to the manufacturing sector. This puts it third in the value of its manufactured goods behind only the food and beverage and petroleum industries.

And that, says Arden Rytz, executive director of the Alberta Forest Products Association, is hard for the residents of oil-and-gas-rich Alberta to understand.

"I think that's because we're very much a rural industry," explains Rytz. "The people in the rural areas know how important we are. There's a payroll there and it's a stable one. The oil industry is here today and gone tomorrow or they send a bunch of valve twisters out from Calgary or Edmonton.

"If there's a IGA store in High Level, it's there because of the forest industry. That's what forestry is all about all across Canada, not just Alberta."

> ***"If there's an IGA store in High Level, it's there because of the forest industry. That's what forestry is all about all across Canada, not just Alberta."***

In fact, says Rytz, five cents of every dollar of income in Alberta comes from the forest industry. That doesn't compare with British Columbia, where 50 cents of every dollar comes from the forest industry. But, says Rytz, it's a significant contribution and one too often overlooked by Alberta's urban public.

"I guess it's partly our own fault," he explains. "We're poor politicians. The fisheries industry throughout Canada doesn't have the economic impact that just the Alberta forest industry has but they've got a much higher public profile."

Forestry's poor public profile may be a historical problem. The first settlers in Alberta shared Dr. Hector's negative view of the 340,000 square kilometres of virgin forest covering more than two-thirds of the province. To them, the trees were simply obstacles that had to be cut down or pulled up to provide farmland.

Even in the early years of this century, the forest industry was small potatoes, explains Bob Steele of the Alberta Forestry

Loading logs at St. Regis (Alberta) Ltd. at Hinton (left)

Stud mill at St. Regis

SUSAN BRUN

Association.

"Our forests were handled by the federal government from 1880 to 1930 when they turned over control of resources to the province. All that was being harvested were large blocks of old timber near the larger centres and settlements.

FRED KATZ

Arden Rytz

"The people harvesting it were small operators and there wasn't much growth right through the 1940s."

Then late in that decade came the birth of today's wide-ranging and economically important forest industry when the province mapped and made an inventory of its valuable renewable timber resource.

"The province decided they'd better know just what that resource was. We were the first province to complete an inventory," explains Steele, a former assistant deputy minister with the Alberta Forest Service of Energy and Natural Resources.

By 1951, the former Alberta Department of Lands and Forests reported sawmills were producing 369 million board feet annually. Thirty-three mills were in operation, but they were no longer near the population centres of Edmonton and Calgary. Instead, the majority were in the Grande Prairie and Slave Lake forests of northern Alberta.

Alberta was also the first province to develop a forest management system during the same period.

"These were 20-year agreements," explains Con Dermott, director of timber management for the Alberta Forest Service. "Companies were guaranteed a large area of timber and they had to agree to do all reforesting of cutovers in that particular area according to provincial guidelines."

The basic idea was to provide the security of a guaranteed supply of wood for a company willing to sink millions of dollars into the construction of something like a kraft pulp mill.

The idea was a good one and in 1954, the province signed its first management agreement with Northwest Pulp and Power (now St. Regis (Alberta) Ltd.) for construction of a pulp mill at Hinton. This, says Steele, marked the beginning of a new phase in Alberta's forest industry.

"Once we got our first pulp mill in 1956 that's when real competition started. Before that, there were just small portable mills and if an operator couldn't get the timber he wanted in a particular area, he'd just pack up the mill and move."

According to a report by W.J. Ondro and T.B. Williamson of the Northern Forest Research Centre, 1956 "marks the beginning of the diversification of forest products industries in Alberta." Prior to that time, says the report, production was limited to lumber required to meet regional demands. After 1956, however, the industry diversified into pulp, plywood, wood preservation and other miscellaneous wood-using industries.

A changing industry required changing management practices and in 1966 the provincial government introduced the quota system, primarily for smaller operators in the saw log industry.

This timber quota system and the management agreements are still the major methods of granting timber harvesting rights in Alberta.

In the two decades since, the forest industry has grown dramatically, Fred McDougall, deputy minister of renewable resources with ENR, told the 1983 annual meeting of the Alberta Forest Products Association.

FRED KATZ

Fred McDougall

"Look back over the past 20 years and you will realize we have more than doubled our pulp production, more than doubled our lumber production and added a whole new flakeboard industry," McDougall said.

In 1981-82, the Alberta forest industry harvested 7.5 million cubic metres of timber, 7.2 million cubic metres of it softwood. That wood was converted into 1,048 billion board feet of lumber and plywood logs; 303,000 units of chips, 625,000 cords of pulpwood; 80,000 railway ties and 334,000 cubic metres of fence posts and rails. The chips and pulpwood, in turn, were converted into about one-half million tonnes of bleached kraft pulp. A far cry from Dr. Hector's pessimistic vision!

The growth of the industry has brought multinational companies like St. Regis, Proctor and Gamble and Domtar into Alberta but many of our companies are home grown, says Rytz.

"Three of the five biggest companies, the

Small Time Operators

SUSAN BRUN

MacMillan Bloedel, Domtar, St. Regis, Crown Zellerbach. These are the names that spring to many people's minds when they think of the forest industry. These are the giants of the business and undoubtedly they have the highest profile.

But for every multinational harvesting timber, there are dozens of small entrepreneurs. And this is especially true in Alberta, says Arden Rytz, executive director of the Alberta Forest Products Association.

"We have seven companies each producing more than 40 million board feet a year but we also have 38 companies who each produce five million or under a year."

In addition, there are innumerable farmers and small businesses harvesting small amounts of lumber for sale. The AFPA provides a service for these entrepreneurs by sending around a portable unit to grade and stamp their lumber so it can legally be sold into the lumber trade and legally put into a house, explains Rytz.

But that's not the bottom of the ladder either, he says. "There are also an awful lot of guys with just a headsaw and edger sitting in their yard, cutting timber for their own use. It goes back to when farmers had to harvest timber to cut costs on their farm and then likely went to work in the winter in the forest industry to make ends meet."

Erik Butters is such a rancher. His Cochrane ranch is on the edge of the forest reserve and every winter he and his father go out and harvest timber to use for fence posts and rails.

They use a small Caterpillar to take the lumber to their own tiny sawmill which Butters says his father "has had from the beginning of time, actually since the early '30s."

Ranching is Butters' main business but in the slow days of winter the timber he harvests helps defray costs. He estimates he produces about 3,000 to 5,000 board feet a year, all of it for his own use on the ranch.

Just down the road from the Butters' ranch, Frank Brooks runs the Brooks Sawmill at a slightly higher business level. A family business, the mill was started by his grandfather in 1923 and now produces about 150,000 board feet in a good year.

Brooks harvests pine and spruce from his own land and sells it to ranchers and acreage owners in the Cochrane area. None of his wood finds its way into lumber stores because in order to sell there, it would have to be graded and stamped. Instead, Brooks contents himself with running a local business for "just about everybody" in the neighborhood and running a few head of cattle on the side.

— *Norma Ramage*

SUSAN BRUN

Erik Butters runs a small sawmill near Cochrane (left top)

Roy Brooks and his son Frank (right) at the family sawmill (left bottom)

ALBERTA GOVERNMENT

Bob Steele

ones that produce more than 40 million board feet annually, are Alberta companies. We're a home-grown industry and we're sort of unique in that regard," Rytz explains.

To oversee and administer this growing industry, the Alberta government's forest management techniques have also grown and changed. The agreements have evolved from simple licences to cut timber to a continuing right to use and manage the land for timber production and harvest.

These agreements guarantee the companies long-term access to a valuable resource and in return make them more responsible for managing it properly, says Steele.

"It's a major advantage in our province to have the forest industry look after management. The industry has the knowledge, the equipment and the people. And the industry has the responsibility. When they harvest they do it knowing they have to replant and if they mess up, it will cost them money."

A major forest management problem identified by experts is lack of money. In a 1983 speech, ENR's McDougall recommended the federal government spend more money on reforestation, genetic research and protection of the forest from fire and other natural hazards.

"Recognizing that the forest industry has been a major tax contributor to the federal government for decades, the federal government should make a long-term commitment to return all the corporate tax revenues from the industry back into the forest for the next 20 years," McDougall recommends.

But despite shortcomings in forest management on a national scale, Al Brennan, ENR assistant deputy minister responsible for the AFS, feels management practices in Alberta are sufficiently good that they are one of the few things about the forest industry unlikely to change during the next 20 years.

This is one of the few provinces with an excess of timber, with only 54 per cent of the allowable softwood harvested and five per cent of the deciduous hardwood.

But, says Brennan, many other things may change because Alberta's industry has lots of room for growth. This is one of the few provinces with an excess of timber, with only 54 per cent of the allowable softwood harvested and a tiny five per cent of the deciduous hardwood.

Brennan believes the figure for softwoods will increase to 85 per cent of the allowable cut within 20 years and that the provincial government will provide the transportation arteries necessary to get the less accessible timber to market.

The AFA's Steele is also optimistic about the future of the industry. "I've thought for 30 years that as oil and gas phase out, the lumber industry will take over. Reforestation alone will be a big industry. Just look at how many people you can employ in replanting."

Both Brennan and Steele, as well as other experts, are also excited about some of the research going on into using the province's vast, almost untapped aspen hardwood reserve.

FRED KATZ

Al Brennan

"We've been putting a lot of research into this," says Brennan, "and we've come up with some exciting breakthroughs."

One of the most exciting, he says, is a water-based polymer that will prevent aspens from warping when they dry. "There was a plant in Slave Lake making studs from aspen but it's a very unstable wood and when it dried it would twist and warp. We think this polymer will stabilize the wood and open up new uses."

Researchers are also working on ways to separate the three main components of wood — cellulose, lignin and hemicellulose — and keep them pure.

"Lignin is nature's adhesive, the thing that keeps the cells of the wood together," explains Brennan. If research can separate and purify this lignin it could be used to replace the petrochemical-based adhesive now being used in the panelling industry.

In the mid-1970s there was widespread interest in using biomass, the total tree, for production of a variety of things, particularly wood gas as a source of energy. But with declining prices for oil and natural gas, that interest has been put on the back burner, says Brennan.

"But in 10 or 20 years when the real crunch over renewable energy sources arrives, we'll be looking at that again."

Norma Ramage is a Calgary journalism instructor and freelance writer.

Gillian Sniatynski

The Crisis in the World's Forests

Clearing and harvesting are outstripping production throughout the world

Forest logged and cleared for agriculture, Malaysia

KARE HELLUM

An article in the December, 1984, issue of *National Geographic* features a photograph of a village boy planting pine seedlings on a bare, steep hill slope near Kathmandu, Nepal.

An accompanying photograph shows what the pine seedlings are intended to repair: whole mountainsides denuded of their forest cover and turned by monsoon-triggered landslides into washed-out gullies.

"An instant desert," comments the magazine, which goes on to note that Nepalese farmers, forced by rising population to look higher and higher for firewood, fields and grazing grounds, have stripped nearly a third of Nepal's forests in the past 30 years.

It's a situation repeated with few variations throughout the Third World. The forests are vital sources of fuel — one estimate is that wood accounts for 20 per cent of Latin America's total energy consumption, 10 per cent of Asia's, and 60 per cent of Africa's. But the crisis of deforestation is primarily caused by the clearing of forest land for agriculture.

A 1981 Food and Agriculture Organization satellite study (quoted in the Vol. 12, No. 2, 1983 issue of *Ambio* magazine) estimates that tropical forests are disappearing at the rate of some 7.3 million hectares a year, while some four million hectares a year are cleared in semi-arid areas. The consequences of such large-scale clearing are profound — and alarming.

Another *Ambio* study explains why. In the tropical forest, for example, most of the ecosystem's nutrients are bound up in the standing plant mass. If this is cut and removed, or if the forest is cleared by burning, the nitrogen and much of the phosphorus are lost.

Remaining minerals are leached by heavy rainfall. The soil becomes so degraded that it is soon unable to support the crops and animals for which the forest had to make way. All this is not to mention the loss of wildlife habitat and plant species, and the soil erosion resulting from increased surface runoff.

Deforestation also results in local climatic change. In tropical areas, clearing the forest allows more heat to reach the soil surface. The *Ambio* article notes that these higher soil surface temperatures, combined with increased runoff, seem to "initiate a process which results in less local cloud cover and ultimately less total water in the system."

Kare Hellum, a professor in the University of Alberta's department of forest science has recently completed a 9½-month contract for the Canadian International Development Agency in Thailand. He notes that, while formal weather records are non-existent, people maintain that the dry season in Thailand is now two months longer than it was 30 years ago.

In those 30 years, Thailand has lost about half its forest cover to dryland rice farming. By the year 2000, says Hellum, there will

A coffee plantation in a forest clearing in Malaysia

KARE HELLUM

probably be no forest left.

His CIDA project was to help set up a tree seed centre, based in Thailand, to provide several Southeast Asian countries with "enough seed of the right species in the right place." While seeing tremendous potential in the project as a whole, Dr. Hellum concedes it may be too late for Thailand, where "native trees are no longer adapted to their natural environment."

Thailand, he says, is "past the point of no return."

But it's not only in Third World countries that the forests are under siege. In the industrialized world, they are logged to support the timber industry. And while it's possible through modern management practices to ensure an adequate timber supply without environmental rape, there is a more insidious threat.

Sandra Postel, a researcher with the Worldwatch Institute in Washington, D.C., writes that over the past decade, scientists have amassed considerable evidence that air pollution from the combustion of fossil fuels and smelting of metallic ores is undermining sensitive forests and soils. Recently, acid deposition has emerged as a growing threat.

KARE HELLUM

Kare Hellum

"Although scientists cannot yet explain how this forest destruction is occurring, air pollutants and acid rain are apparently stressing sensitive forests beyond their ability to cope," says Postel.

"Weakened by air pollutants, acidic and impoverished soils, or toxic metals, trees lose their resistance to natural events such as drought, insect attacks and frost. In some cases the pollutants alone cause injury or growth declines."

Postel notes that "massive tree disease and death" are now spreading through central Europe. In West Germany alone, one-third of the forests are estimated to be damaged, and "Waldsterben" ("forest death") is now a household word. She quotes a recent editorial in a forestry journal, written jointly by a German forestry professor, the president of the German Forestry Association, a Regensburg forester, and a former visiting scholar from the U.S.:

"The results of 200 years of forest management seem to be extinguishable within the next 10 years . . . Only a few people think about an all-too-possible scenario: central Europe without forests."

Scientists have amassed considerable evidence that air pollution from the combustion of fossil fuels and the smelting of metallic ores is undermining sensitive forests and soils.

From her Washington vantage point, Postel also notes that in Canada, damage to vegetation around sulphur-emitting smelters has long been evident, but so far no firm evidence exists of growth declines from regional air pollution or acid rain.

"Yet more than half of Canada's productive forest lies in the eastern part of the country where precipitation is acidic and soils have little buffering capacity. With one out of every 10 Canadian jobs dependent on the forest industry, and annual forest products valued at more than $20 billion, Canadian officials are understandably concerned about acid rain's potential to damage their timber supply."

Canadian officials may well be concerned. But it's hard not to be cynical about the likelihood of a constructive outcome to this concern. For decades the Canadian forest has been exploited, and large areas have been lost forever, without any help from acid deposition.

Forests cover 44 per cent of Canada, and forestry is the principal industry in every region of the country except the Prairies and Ontario (where it is still important economically). Most of Canada's fur production is dependent on the forest.

But, adds Fred McDougall, deputy minister for renewable resources with Alberta Energy and Natural Resources (and himself a forester) there is much more to forests than gross national product, employment,

WORLDWATCH INSTITUTE

Sandra Postel

Containerized seedlings at a reforestation nursery in Malaysia (photo below)

tax base, and foreign exchange earnings.

"The forests of Canada are the basis for a very large part of our outdoor recreation. They dominate much of our landscape. Much of our wildlife exists within the forest ecosystem, and most of our hunting and fishing takes place in a forest setting.

"The forest is important to the regulation of water flow, the preservation of soil productivity, the purification of air and the modification of climate. In fact, more Canadians relate to the forest through its recreational and esthetic value than through timber."

Yet all this, it seems, is under threat. A statement in March, 1983, by the Science Council of Canada makes no bones about it:

"Until the last decade . . . Canadians had often regarded forests as something to be exploited and have depended too heavily on natural regeneration rather than scientific management for optimal regeneration. We are now suffering the results of this attitude. Much of Canada's high-quality, old-growth forest has been harvested; much that remains accessible is overmature and defective. Fire, insects, disease and wind destroy two-thirds as much timber as is harvested annually. . .

"One-eighth of Canada's productive forest area has deteriorated to the point where huge tracts lie devastated, unable to regenerate a merchantable crop within the next 60 to 80 years. Each year some 200,000 to 400,000 hectares of valuable forest are being added to this shameful waste."

It is a story of "neglect and failure on a grand scale," says Les Reed, forester, consultant, former assistant deputy minister in Environment Canada (responsible for the Canadian Forest Service), now in the new chair of forest policy research in the University of British Columbia's faculty of forestry.

Reed can point to actual or impending timber shortages all across the country — basically because what has been taken hasn't been promptly replaced, and what is there isn't being adequately protected and nurtured.

Much of Canada's high-quality, old-growth forest has been harvested; much that remains accessible is overmature and defective. Fire, insects, disease and wind destroy two-thirds as much timber as is harvested annually.

But, he says, "it doesn't have to go that way." The answer is in properly managing the forests so that supply is able to keep up with demand, and environmental damage is minimized.

Forest management implies regarding timber as a crop to be farmed, *not* as a resource to be exploited. It means harvesting based on the age of the tree rather than proximity to the mill; preparing cleared sites and artificially seeding and planting rather than relying on natural regeneration; tending, fertilizing and thinning the growing crop and protecting against fire insects and disease, rather than always letting "nature take its course."

It's nice to know that the province with by far the best track record for forest management is Alberta.

That's partly because industry (including the timber industry) is fairly new. As with many other environmental problems, Alberta has been able to learn from mistakes made elsewhere.

The largest tracts of forest land now being managed for timber are controlled by forest

KARE HELLUM

Oil palm nursery, Indonesia

Tropical Forests

The tropics lie between the Tropic of Capricorn and the Tropic of Cancer. Within this belt are not only the vast rain forests of the Amazon, the Congo and Southeast Asia, but also the least developed countries and those with the highest birthrates.

Sandra Postel, a researcher with the Worldwatch Institute in Washington, D.C., quotes a study just released by the U.S. Office of Technology Assessment which suggests that enormous population growth, together with accelerated development, will radically alter the tropical environment.

"The demand for firewood, agricultural land, and raw materials to fuel industry will soar. Due to the sheer size of the projected growth and the vulnerability of the forests, the result of development in the tropics could well be desertification, deforestation, and overall land degradation on a massive scale."

The study notes that the world's tropical forests contain some three million species of plants and animals — about 2.5 million of them unclassified. As the tropical habitat shrinks, an enormous diversity of life might vanish before its worth or even its existence could be determined.

The loss of huge amounts of forest also endangers the quality of life for those people whose subsistence depends on it. Besides providing for the basic needs of millions, the study says, "forests help maintain soil quality, limit erosion, stabilize hillsides, modulate seasonal flooding, and protect waterways from accelerated siltation."

They provide a livelihood for hunter-gatherer populations, and at the national level are an important source of foreign exchange.

Deforestation threatens food supplies and jobs.

Postel concludes: "The threat is not simply an environmental problem; loss of forest resources will have social and political implications the world over."

— *Gillian Sniatynski*

management agreements between the timber companies and the provincial government, which (as in the rest of Canada) controls most of the forested areas.

The agreements are renewable after 20 years, provided the companies have met stringent standards for regeneration and environmental protection.

"The significance of our emphasis on forest management is that it has placed our forest industry on a secure basis for the future," says Alberta Energy and Natural Resources' McDougall.

"All of our mills have secure future wood supplies. . ."

But it seems that, even in Alberta, the forests are not completely safe. The threat here comes not from the timber industry but from the activities of the petroleum, gas and coal industries.

In 1979, the Environment Council of Alberta released a report and recommendations, after public hearings across the province, on the environmental effects of forestry operations in Alberta.

The report expressed concern about the magnitude of the impact of non-renewable resource extraction on the renewable forest resource. It's a conflict still unresolved.

The provincial department that houses Alberta's forest administration ("the finest in Canada," says Reed) is also the one that controls the non-renewable resources. Yet McDougall refutes any suggestion that the forests lose out to the demands of the non-renewable resource companies. He notes that fire, for example, destroyed millions of hectares of forest in the three years from 1979 to 1982 - dwarfing every other loss (including that to resource extraction). Yet petroleum revenues allowed the department to spend $75 million on fire protection in 1982, as well as providing such state-of-the-art facilities as the Pine Ridge Forest Nursery.

Though the coal industry may not be generating the same revenues, says McDougall, most extraction on timber leases involves mature forest — and the timber companies, as well as being able to salvage the lumber, also collect substantial compensation. The coal companies are also obliged to reclaim the land they disturb.

None of those arguments wear well with someone like Des Crossley.

Crossley is a forester with wide experience, as a researcher with the Canadian Forest Service, and for 20 years (until his retirement in 1975) as chief forester for North Western Pulp and Power Ltd. This was the company that, in 1954, signed the first, pioneering forest management agreement with the provincial government.

Crossley is acknowledged to be responsible for much of the success of the agreement system, because his determination to manage the North Western lease on sound silvicultural principles provided such a good model for the agreements that were to follow.

He is very concerned now about the encroachment of renewable resource industries, especially the coal industry. And he doesn't feel monetary compensation is the answer for forest companies faced with the loss of part of their land, perhaps for many years. "You can't put money through a mill."

"It's going to wreck forest management licensing in Alberta," he says. "Once, I could stand up anywhere in Canada and defend our program. Now I couldn't."

Gillian Sniatynski, the former editor of this magazine, is now a freelance writer and editor living in Drayton Valley.

Ronnene Anderson

The Forest Resource

Conflicting demands and competing land uses

Just 100 years ago much of the forest was practically untouched. Now, people hike through it, play golf near it, cut it, sell it, run snowmobiles through it, hunt elk in it, dig for coal under it and just plain look at it.

Susan Calp's family is in the lumber and pulpwood business. When she was nine years old, in the early 1950s, she watched her father plant trees on his land, long before reforestation was standard practice.

"I've always thought of the forest as providing multiple benefits - recreation, wildlife, watershed, grazing, esthetics — as well as timber for the timber industry," she says.

Calp grew up, became a forester and joined the Alberta Forest Service's land use branch, where she and her colleagues are faced with burgeoning demands for those "multiple benefits."

Two-thirds of Alberta is covered with forest, most of it owned and managed by the province. Just 100 years ago much of it was practically untouched. Now, people hike through it, play golf near it, cut it, sell it, run snowmobiles through it, hunt elk in it, dig for coal under it and just plain look at it.

As Alberta's population increases, so does the competition for the forest resources. Here are some recent conflicts:

- In 1980, farmers south of Slave Lake blocked a road to prevent the forest service from planting trees in an area the farmers wanted for agricultural expansion.
- At a 1978 public hearing sponsored by the Environment Council of Alberta, timber industry spokesmen said they were losing prime timber land when oil companies cut paths through the forest for seismic exploration equipment; citizens complained the paths increased public access and led to overfishing and overhunting.
- In 1983, the Alberta Wilderness Association began protesting a clearcut logging program in the Hidden Creek basin in the Eastern Slopes, saying it would disturb a valuable wildland recreation area that is only a two-hour drive from Calgary.
- Jack Wright, chief forester of the St. Regis forest products firm at Hinton, 1984: "We have no guarantee that we'll be harvesting the areas we've regenerated. Other uses may take priority. We have about 9,000 acres (3,642 hectares) in the area of our oldest regenerated forest that is now part of a coal mine. This area was close to our mill. Now it's lost for a full rotation (80-100 year growth cycle)."

Few forest users believe their preferences should exclude all others. But they may disagree on where a balance should be struck, and those disagreements reflect different perceptions of the forest.

Chris Andersen is woodlands division manager for Canadian Forest Products Ltd. in Grande Prairie. He also grows grain on his 648-hectare farm. This is his viewpoint:

"As a forester I regard the forest in much the same way a farmer regards a farm. It's a piece of land that we can use to produce goods for society. I'm talking about all aspects — water, wildlife, recreation. But

FRED FAT.

Susan Calp

like a farmer who would have an awful time looking at a crop that's ready to harvest and not doing anything about it, I look at a crop of timber and I get an awful urge to start harvesting. That's a concept that's hard for the public to understand."

Similarly, he says, "as a farmer looking at a field in the spring, I want to start seeding. As a forester seeing a cut-over or burned-over area, I want to start planting."

Now listen to James Butler, professor of wildland recreation in the University of Alberta's forest science department: "When I look at the forest I see a very complex ecosystem where man is only one component. I don't particularly view the forest in a man-focused way, looking at what's useful to us. The forest shouldn't have to benefit us directly for us to have concern for it.

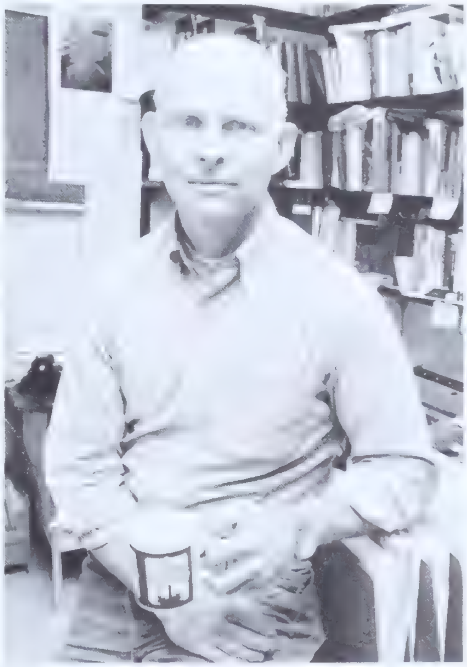
"All those trees that appear overmature and decaying to a forester, and therefore in need of cutting — to an ecologist are often only reaching their prime for wildlife habitat."

For instance, Dr. Butler says, the mature spruce-fir forests of central Alberta are the niche of Canadian wood warblers, but logging there is shrinking the birds' habitat.

Richard Pharis, University of Calgary botany professor and a director of the Alberta Wilderness Association, describes the pleasures of the back country:

"It's a feeling of freedom. You're on your own. You can stand on a ridge and look around and not see areas that have been appreciably disturbed by human use . . . We need areas kept wild for a variety of reasons — the re-creation of one's spirit by traditional uses of the back country, such as fishing, hiking, travel by horse and hunting."

Today, Alberta Energy and Natural Resources promises that all of these voices will be heard through its five-year-old "integrated resource planning" approach to forest management. It's actually an extension of the multiple-use concept introduced in the 1970s, whereby two or more activities, such as logging and grazing, can occupy the same forest space.



FRED FAT.

Richard Pharis

But now the focus is on more formal co-operation with other government departments and agencies, and more public participation.

The forest service's Calp gives an example of integrated planning in action:

James Butler

The Wild Kakwa area southwest of Grande Prairie, which is surrounded by valuable timber and oil and gas reserves, was already a protected recreation spot when the forest service set up a planning team in 1982 to "maintain the wildland character." On the team were environmentalists, motorized vehicle users, commercial outfitters, fishermen, hunters, trappers, forest industry spokesmen and other government resource management agencies. They met regularly to seek public opinion, and a public workshop was held in Grande Prairie.

"It was collaboration, not confrontation or compromise," says Calp. "The oil industry and the (ENR) Fish and Wildlife Division drew up plans to minimize the impact of oil and gas exploration, and people involved with commercial recreation, like the outfitters, worked out their differences with the all-terrain vehicle users."

Eventually, the government expects to have integrated plans for all of Alberta's forests. Right now there are three regional plans, 17 subregional and four local — most of which are still being developed — and an Eastern Slopes policy which supports development of a strong tourist industry.

By keeping the public informed at the early stages of forest planning, the government hopes to avoid the kind of reaction that followed the Hidden Creek logging announcement.

In that case, Calp says, the AFS had long

Natural reforestation of a burned-over lodgepole pine forest (left)

This 152-year-old tamarack near Stony Plain was nominated for The Trees of Renown program because of its size (below)

Trees of Renown

ALBERTA GOVERNMENT

In the year 1265, or thereabout, an Engelmann spruce began its life among the icefields of what is now Jasper National Park. It grew slowly in the unforgiving climate, but it had an advantage: rocky terrain isolated it and neighboring trees from other stands, making them less vulnerable to spreading forest fires.

Today this tenacious spruce is featured on the first page of *Alberta Trees of Renown* — a pictorial honor roll of unusual historical and record-holding trees published by the Alberta Forestry Association.

After a stem core sample revealed 720 annual rings, the spruce was judged the oldest living tree in the province, despite its small size: 12 metres tall and 38 centimetres in diameter.

The AFA, a non-profit group of foresters, conservationists, timber harvesters and others, printed 5,000 copies of their first honor roll last spring, as an educational project to identify and help protect unique trees.

The public response has been "extremely positive," says association president Dave Kiil, who is also director of the Northern Forest Research Centre of the Canadian Forestry Service. Queries about the program have come from all over Canada and the United States. "Hopefully, we'll eventually have a Canadian Trees of Renown program," says Kiil.

A second Alberta honor roll is planned for this spring, and the AFA is seeking nominations for this and future editions. Interested people can write to the association at: Suite 311, 10526 Jasper Avenue, Edmonton, T5J 1Z5.

The University of Alberta forest science department receives the nominations and supervises verification.

— *Ronnene Anderson*

White Spruce

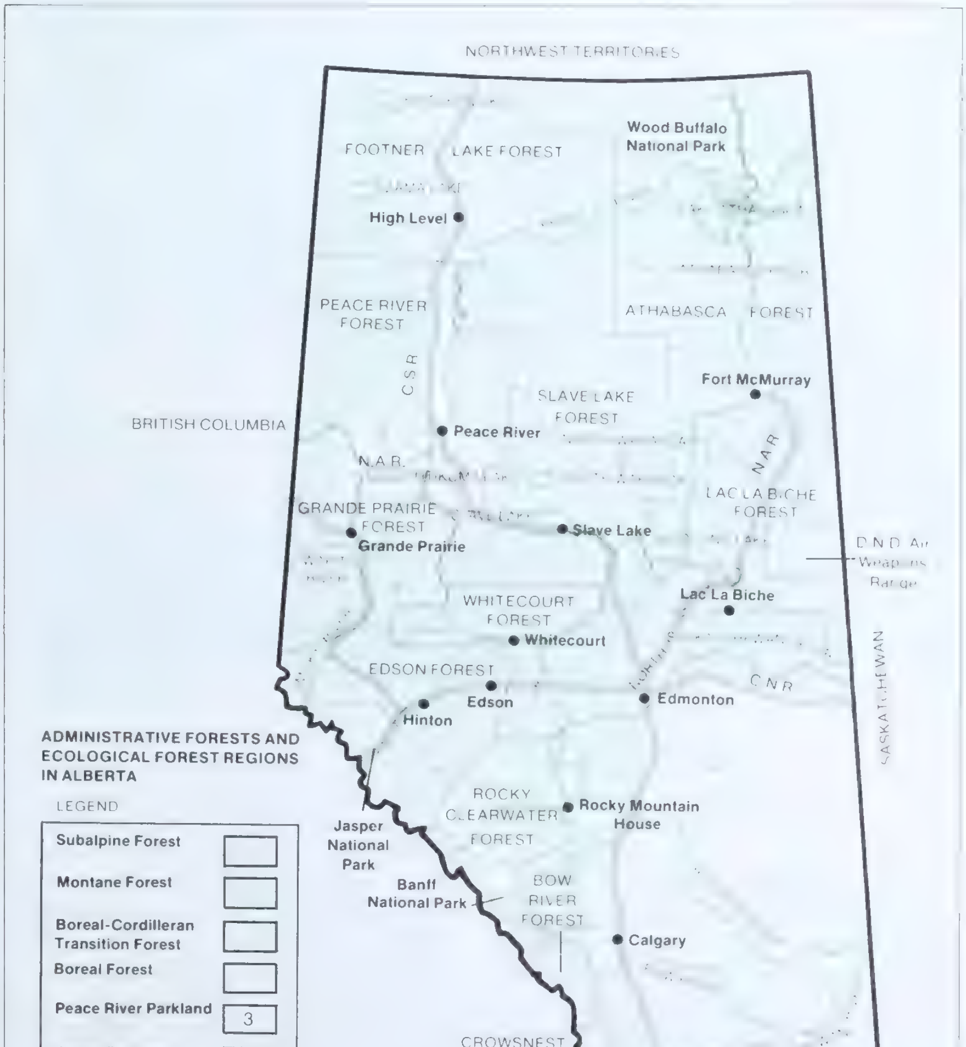
Aspen Poplar

Lodgepole Pine

designated the area as multiple use, and had commitments to a logging firm. The AFS had also supported the creation of a natural area just to the north called Beehive.

"The decision to log wasn't made in isolation of other uses. In terms of supply and demand, we felt we could accommodate forestry and recreation and wildlife," Calp says. "We're looking at the big picture . . . We recognize the need for low-access, relatively pristine wildland. We have our natural areas program, our Eastern Slopes protection areas and our ecological reserves. You realize there's more there than you thought."

Nevertheless, Dr. Butler says the Hidden Creek decision was "a severe mistake" and contributes to growing animosity toward logging companies.



ADMINISTRATIVE FORESTS AND ECOLOGICAL FOREST REGIONS IN ALBERTA

"If foresters, both in industry and government, would be more reasonable about places like Hidden Creek, they would find they'd have far more supporters to side with them against what are sincere threats to the forest land base, such as agriculture getting into areas it shouldn't," he says.

In Alberta's Peace River country, the main competition for forest uses is indeed between farmers, who want more land for tilled crops and grazing, and foresters, who fear they will lose good timber land close to their mills.

At an Environment Council of Alberta hearing in 1983, timber industry officials said much of the land in question is marginal for crops, because of poor soil quality or severe climate, but it produces some of the better timber. They urged improvement of Alberta's existing farmland, rather than agricultural expansion.

Andersen says: "A 1,200-acre (486-hectare) land base will produce one full-time job in forestry at forestry wages, (which) some farmers would love to have. This is compared to large costs to develop an 800-acre (324-hectare) farm which may or may not produce a full-time job."

Although grazing can be compatible with forestry, most farmers want to improve grazing by encouraging grass growth and discouraging trees, he says.

"Agriculture is an emotionally loaded subject. Everyone wants a little piece of land. It's often more emotional than economic . . . They can say to us (foresters), 'you guys can just move a little further into the hills.' The problem is, we're running out of hills."

Calp describes the government's dilemma: "Agriculture is the cornerstone on which Alberta was built. Some of the best Crown lands that are left and available for agriculture are in the Peace River region. . . But it's important we recognize the potential of Alberta for the national forest industry.

"Agriculture is very much a single use. As soon as you cut all the trees off, you have no more forest, not for 90 to 120 years. But

Alberta's Forests

No two forests in Alberta are alike. In fact, says Richard Pharis, a University of Calgary botany professor, "if you walk around a knob of a hill, you walk from day into night. It's almost that spectacular."

Some forests are "virtually sterile in terms of life forms such as birds and bees and butterflies and animals that move," says Dr. Pharis. He cites a dense "dog hair" lodgepole pine stand, where "you can't move through without bending the stems with your hands."

Yet, 200 metres away, near a creek, you may find an open grove of aspen poplar with more vegetation, and more animals.

Most of Alberta's forested land lies in the boreal zone, or northern forest, which stretches across north central Canada. It is characterized by black and white spruce, tamarack, aspen and balsam fir. The mountains and foothills to the west are dominated by lodgepole pine, Engelmann spruce and fir. About 60 per cent of the forest species are conifers, or cone-bearing trees, and the rest are deciduous.

Alberta doesn't have the towering Douglas fir forests of British Columbia; tree growth is limited by cool soil temperatures, especially in the north. But the timber is still valuable.

Chris Andersen, woodlands division manager for Canadian Forest Products Ltd., in Grande Prairie, says white spruce and lodgepole pine are the best Alberta trees for lumber and plywood because of their size, strength and uniformity.

Deciduous trees are difficult to process for lumber and also lack the longer fibres required for wood pulp used to make paper. However, two Alberta firms are using the plentiful aspen to make panel board for construction, and Andersen's company is starting a three-year experimental program with aspen lumber.

Rick Annas, a private researcher in forest ecology in Stony Plain, says few Alberta forests are more than 140 years old — thanks to fire. The process of growth and succession after a burn can follow many courses, but here is Annas' version of a typical succession after fire destroys a foothills forest of white spruce, lodgepole pine and aspen:

The lodgepole pine cones are sensitive to heat and will open after a fire, becoming the first to seed. Damage to the aspen can stimulate suckers from the living roots, and surviving spruce along the edge of a burn will scatter seeds to the wind.

The aspen and pine grow fastest in their younger years, but by 80 years, they will slow down and the white spruce will catch up. By 120 years, most of the aspen is dead, "so you're left with a coniferous forest where you started with mixed wood."

Dr. Annas continues: "After a fire, there is quite a blooming of herbs and shrubs, and this is the kind of environment moose and deer find especially attractive." Forty years after the fire, you'll find more squirrels, while moose and deer would only use it for escape or someplace to bed down and keep warm.

"That's pretty much the story of our forests," says Dr. Annas. "With so many disturbances, it's a patchwork, with cyclical communities always developing."

— Ronnene Anderson

if you leave them there, they are there for wildlife, recreation, the water supply . . . You have to be very sure you are choosing the best use."

Also, says Calp, farmers often harvest timber to supplement their incomes. "So it's going to have to be a real balancing act in determining how far you can expand agriculture and still ensure that the off-farm employment opportunities are available.

"We want to evaluate the two in an equitable way, based on the physical capability of the land, the economic criteria and the public demand."

Other pressures on forest resources are not as great in the north as in the Eastern Slopes. However, Dr. Pharis says new wildlife habitats and tourism opportunities could be gained by changing timber harvesting practices.

"A lot of people will travel long distances to view a moose on the edge of a muskeg," Dr. Pharis says.

He maintains the blocks of clearcut forest in Alberta usually are too big, and animals cannot reach the middle of browsing grounds in a regenerating forest because shelter habitat is too far away.

Smaller clearcuts are the answer, he says, but "it takes planning, money and it may not allow for maximum profits for the timber industry."

Calp answers: "Do we need more wildlife? How do we know we need more wildlife? You have to look at what you have now, what you need, before you know if you have a deficiency. How do you determine the value of the recreation from a tourism perspective? It's difficult."

Timber cutblock sizes are carefully planned with wildlife as well as other uses in mind, she said. "It's not to say we couldn't make another decision at another time, with more information. . . . The reality is, the value of the resource depends on the demand for the resource."

Dr. Butler says the Alberta government has been receptive to corporate demands, "often at the expense of their environmental responsibilities to future generations of Alberta."

Calp says: "Those who provide jobs – that is always going to be the first-line interest of the public and the government . . . But we can't look at being pressured. The production of timber supplies is our major function as an agency, but we must consider the requirements for other land uses and for environmental concerns.

"At one time the balance was tipped more in favor of timber production, because there weren't so many pressures on a limited land base. Now the Alberta Forest Service looks at the forest resource in terms of the forest, not just the trees."

Ronnene Anderson, a former journalist, is an Edmonton freelance writer

"At one time the balance was tipped more in favor of timber production, because there weren't so many pressures on a limited land base. Now the Alberta Forest Service looks at the forest resource in terms of the forest, not just the trees."

Susan Bramm

Tending the Forest Garden

Containerized seedlings from the Pine Ridge Forest Nursery

The Roman Emperor Hadrian saw an aged man planting olive trees. Knowing that olive trees are one of the slowest growing of trees, the Emperor said to the bent, frail man, "Those trees you plant will not bear olives for many years to come. Do you expect to live long enough to enjoy the rewards for the work you are doing?" The toiling man looked up. "If the gods will, I shall, and if not, my sons will eat the fruits of my labor. My father and his father before him planted olive trees that I might have fruit. It is now my duty to help provide for those who will come after I have gone."

Orchards have been around for a long time. Man's cultivation of trees has ensured a more stable and accessible food supply for him. In the process, part of the natural environment was transformed into a managed one.

Forestry in Canada has not shown a similar progression. Most forests have been plundered and left to start over, while the harvesters have moved on to greener hills. The demand for wood and wood products has continued to grow, with a corresponding depletion of natural reserves. Soon the readily accessible natural stock will be gone.

"Everybody assumes that forests are a renewable resource. It's a motherhood statement," says forestry consultant Don James of Irricana, Alberta. "The concept is still rampant that the forests are limitless and there for our use and abuse and that by some miraculous process they'll always be there. Few people understand what's involved in keeping the forest a renewable resource, that someone has to take responsibility for its continued presence."

Renewable resources sustain life on this planet. For example, water is said to be renewable because it is self-replenishing. However if water sources are excessively polluted or tapped, water may become unusable and unavailable.

Harvested forestland is renewable although it will take a long time for the new growth to reach the type and maturity of the one it replaced. Man can ensure that cutover areas are productively renewed by practicing silviculture, the art and science of tending the forest as a crop. Silviculture, like agriculture, involves sequential management. This includes site preparation, planting or seeding, weeding, thinning and harvesting.

"We have been mining our forests when we should have been farming them," said John Roberts, former federal environment minister, in 1980. "The status of forest management in previous decades is not something we can take pride in." The rate of renewal has fallen far short of the rate of cutting. In Canada, an estimated 30 per cent of cutover areas naturally regenerate to forests of similar composition. Between 1975 and 1980, only 21.8 per cent were prepared for regeneration. Thirty per cent (237,000 hectares annually) remained unstocked with merchantable species, adding to a backlog of millions of hectares.

"Accessible lands that once grew softwood forests of spruce, pine and fir have commonly reverted to brush and low value hardwoods," writes Fred McDougall, deputy minister for renewable resources at Alberta Energy and Natural Resources, in the June 1984 *Forestry Chronicle*. It will be a long time before these areas develop productive softwood forests, he wrote.

According to a Canadian Forestry Ser-

Better Trees for Tomorrow

Of all the flowers in your garden, have you noticed that some seem to grow faster, have more flowers or survive those early September frosts? If you use seeds from those plants, you might have a better garden next year.

Alberta has only begun to do the same with its trees. Most of the work is on lodgepole pine and white spruce, Alberta's most important commercial species. Bruce Dancik, a professor in the University of Alberta's department of forest science says that although trees grow faster in New Zealand and South America, our long-fibred species produce strong paper, which is a valued commodity on the world market.

There is a long checklist of factors that are important to the forester: height; rate of growth; straightness (for long, straight lumber); degree of taper of the tree stem; resistance to harsh growing conditions, diseases and insects; wood quality; angle of branching (which affects the size of knots in the lumber) and crown size (which affects the number of trees that can grow per hectare). But no tree will exhibit all these favorable traits.

The genetics section of the Alberta Forest Service is responsible for the overall management of forest gene resources, genetic improvement and related work in practical tree breeding and cultivation. It has embarked on a program to develop one improved strain of seed for each of Alberta's nine reforestation regions.

It's a long process to produce trees better suited to our purposes. First, seeds and cuttings are taken from native trees exhibiting optimum characteristics. Successful offspring from these are selected and maintained in a seed orchard, a specialty plantation established specifically for the production of seed for reforestation, like a fruit orchard. After several years (up to 15 for white spruce) these trees will produce seeds that can be used for large-scale seedling production. The first seed of Alberta's genetically improved trees is expected to be ready for use in 1995.

ALBERTA FOREST SERVICE

Forests planted with this seed will probably be more intensively managed than those of today. The genetic component may add a 15-to-20-per cent improvement but when combined with intensive management the result could be up to a 200-per cent improvement, says Narinder Dhir, head of the AFS genetics section.

The forest service is also conducting research that will fine-tune their selection processes. "Here we may have something of a concern with lodgepole pine and the western gall rust. We are developing screening procedures for susceptibility."

The province's universities are augmenting this work. At the University of Alberta, for example, a graduate student is developing a method to rate the performance of young seedlings. If successful, this would eliminate the need to wait for many years before evaluating the offspring of selected trees.

Dr. Dancik's students are studying the trees' genetic building blocks. "We're getting involved with molecular genetics and trying to take apart the DNA molecule for lodgepole pine and map it. In future we might be able to locate specific genes for traits like disease resistance and then try to introduce them in other trees."

Is a forest monoculture being created in Alberta? Dr. Dancik and colleague Kare Hellum say no. Dr. Dancik says that in the public mind monoculture means one species, but in genetic terms it means genetically uniform plants. He says that there is wide genetic variability within each species in Alberta.

Dr. Hellum says that because of the long time required to develop improved strains, forestry cannot reach the purity of culture found in agriculture.

"The only place we might be worried would be if we cloned (reproduced by planting cuttings from the same stock) and then put the same clone all over the place", says Dr. Dancik. These genetically uniform stands, although superior in certain ways, could exhibit similarly uniform susceptibility to harm by disease, insects and adverse environmental conditions. Although there is a trend towards using clones in forestry, this high-tech approach uses many clones to maintain variability and is unlikely to be used in Alberta for some time to come.

It is possible that in the future we may be breeding for trees with different characteristics. AFS is committed to establishing and maintaining the gene pool reserves from which to draw. "We always have to have that storehouse of genetic variability," says Dhir.

"A corn breeder would get bored with our work — such long (growth) periods," says Dhir. "We're accustomed to working for the future, setting it up for the next generation to inherit and continue."

— *Susan Bramm*

vice report on silviculture, attention to forest regeneration across Canada between 1975 and 1980 ranged from 3.8 per cent in Quebec (where the largest area was harvested), to 39.6 per cent in British Columbia and 77 per cent in Alberta.

The Alberta Forest Service estimates that 85 per cent of all cutovers in this province now receive some sort of site preparation, seeding or planting. This is the only province with legislation requiring operators to reforest at their own cost as many trees as they cut.

The rate of regeneration is intended to keep pace with the rate of harvest, which has averaged 22,000 hectares over the past 10 years. "The assumption in our system is that if we meet the minimum standard (and quite often we exceed it), productivity of the second growth stand will at least match the productivity of the original stand and by this method we will maintain the annual allowable cut and growing stock," says Steve Ferdinand, acting head of the the AFS reforestation and reclamation branch.

Since 1966, says Con Dermott, head of the timber management branch, large companies have regenerated 95 per cent of the land they have harvested while smaller companies have a 91 per cent success rate.

"You always have some fail areas. We have some we've treated three times but we feel the system is working well."

In a 1978 report on forest management in Canada, R.M. Newham concludes, "Alberta is above average in forest management practice, particularly in ensuring prompt regeneration of cutover land."

"We've had a system in place since 1954

Collecting pollen for breeding program (left)

Con Dermott

and expanded to the entire province in 1966. And industry pays here. We don't do any reimbursement. They pay for reforestation," says Dermott. Operators who harvest over 34,000 cubic metres per year do their own work. He says the forest service checks very thoroughly to make sure the provincial guidelines are met. Smaller companies have the option of doing the reforestation or paying a levy of $2.30 per cubic metre harvested to cover the cost of having AFS do the work.

"What you are responsible for when you sign that agreement is just to make the land produce or harvest what it grew each year. You want to maintain the productivity that nature put down," says Des Crossley, who was chief forester for the Northwest Pulp and Power company (now St. Regis) that signed the first Forest Management Agreement in 1954. "Nature is very wasteful. All of us know that we can make a piece of wildland produce three or four times what nature can produce. But that's getting into intensive forestry. Nobody can make industry go beyond that sustained yield level. . . That's the first step. When you get there then you can go on."

Alberta's system is based on renewable tenure. The lease or agreement is renewed if all conditions have been met, including those relating to reforestation. Usually 50 per cent of the harvestable area can be cut first. The second cut can not be done until successful regeneration has been achieved on the previously harvested half. If a company, through its efforts, is able to produce more than the sustainable yield, it pays no tax on the surplus it harvests. Crossley says that Alberta is the only province that provides this incentive to industry.

How do Alberta operators meet their silvicultural obligations? Bob Udell, assistant chief forester for St. Regis (Alberta) Ltd.'s operation near Hinton, says studies done by his company show that there is excellent regeneration with a combination of clearcutting and scarification (a system in which heavy equipment or chains are run over the clearcut ground to press bush slash into the soil and open it up to natural seeding).

SUSAN BRUN

Bruce Dancik

"Most of our reforestation is for lodgepole pine," he says. "Our technique is similar to nature — a forest fire goes through and destroys a whole forest, clears it out for growth of a strong new forest. What we do is take the trees and use them, instead of them being burned. We leave the cones from the trees in the slash, and then with scarification we have a regeneration process similar to nature.

Don James

"But we do it better," Udell says. "We don't have as many new trees starting in the area as there are in a completely natural situation, so they don't have to fight it out with each other for survival. Our studies show we're getting a lot better and stronger regrowth — the diameter is five or six inches after 20 years of growth, compared with about one to one-and-a-half inches at that age in the original forest. We've counted original stands as high as 150,000 trees an acre, where the young stands are spending the first 30 to 40 years of their lives just thinning themselves out."

The Alberta Forest Service estimates that 15 to 20 per cent of harvested areas in Alberta regenerate without site preparation, seeding or planting. St. Regis usually prepares and leaves its sites to seed naturally. "We get about 70 per cent of our cutover areas restocked naturally," says its chief forester, Jack Wright. Those areas that are not satisfactorily stocked are planted. "This year (1984) we planted over 5,000 acres (2,025 hectares) including some areas that were harvested seven years ago and some more recent cuts." The average cost of reforestation for all types of work is $270 to $284 per hectare.

Although the larger companies may produce their own seedlings, the majority of

The Herbicide Controversy

A little seedling on a cutover can face some tough competition.

"When you clear the trees, you establish (the forest) at an early stage of succession but the native vegetation of that area is fully capable of exploiting that site. So a tree that is planted is at a great disadvantage and it needs help. If you don't help it, that investment will be lost," says Don James, a forestry consultant.

"We cannot afford to waste valuable cropland growing weeds instead of trees," writes the Canadian Federation of Professional Foresters in a 1983 brief on herbicides. Control of competing vegetation results in dramatic increases in forest productivity (by as much as 300 per cent) says the federation. It notes that the most productive lands are usually most prone to brushing in.

Herbicides are an effective and cost efficient forest management tool. They are likely to play an increasing role as attention turns to ensuring the success of reforestation efforts, but there has been little use of them in forests in Alberta, due to cost, limited applicability of available herbicides, and regulatory controls.

For some situations herbicides are considered the most reasonable method of vegetation control. Steve Ferdinand of the Alberta Forest Service says that one or two aerial applications over the lifetime of the forest will control competition while several (more expensive) weedings by hand may be required to achieve the same result. In some parts of the province, herbicide use is the only satisfactory means to control persistent competition from grasses, he says.

Ground spraying of Roundup near Kinuso

ALBERTA FOREST SERVICE

In the summer of 1984 the Alberta Forest Service used airplanes to spray a chemical named Roundup for brush control on about 400 hectares of planted white spruce near Kinuso, about 200 kilometres north of Edmonton. This program also included manual clearing work. It was initiated after approval by several government agencies and consultation with three public interest groups. Two fish and game groups were satisfied with it but the local community association was opposed to spraying of any sort.

Some of the public's fears are based on the fact that chemicals such as DDT were once also considered safe, and are now banned. In 1983 a group of citizens in Nova Scotia went to court to stop Nova Scotia Forest Industries from spraying the herbicides 2,4, 5-T and 2,4-D. They felt that they had the right to be free from any exposure to these phenoxy compounds. The Nova Scotia Supreme Court rejected their claim because it ruled that the currently accepted view of responsible scientists is that these chemicals are not mutagenic or carcinogenic for humans, and safe levels have been scientifically established.

Herbicides are used on a large scale in agriculture. According to the Canadian Institute of Forestry, about 75,000 hectares of Canada's forests are treated with herbicides every year while agricultural treatments involve 30 million hectares. Only about one half of one per cent of the herbicides used in Canada each year are applied in forestry.

But forest lands are different from agricultural ones and little is known about the effects of herbicide use in forestry. Paul Addison, a research scientist and plant ecologist with the Canadian Forestry Service, indicated that the forest is a more diverse ecosystem. He says that the management of a forest must be more flexible to allow for other uses, such as wildlife habitat and recreation.

Addison is initiating a long-term research project that will investigate the impacts of herbicide use in forestry. There is a long list of unknowns, including how herbicides persist and degrade and how they affect the crop species. "We don't know the impact on the long term stability of the forest ecosystem, one which sustains wildlife, aquatic life and man," he says. He hopes that this work will provide scientific information to agencies and industry on the environmental costs of using herbicides.

"At this point we are taking the attitude that herbicide application is inevitable. My concern is that it gets used in an ecologically sound way. Development with care."

— *Susan Bramm*

New cutover forest (left) and 13-year-old regenerated forest

Greenhouse at Pine Ridge Forest Nursery

seedlings in Alberta are produced by the Alberta Forest Service's Pine Ridge Forest Nursery, located 145 kilometres northeast of Edmonton. Using specially designed equipment and a "seedling line", it can produce 20 million containerized seedlings and up to 16 million three-year-old field trees each year. About 80 per cent of those produced are lodgepole pine and the rest are white spruce. This production capacity currently exceeds the demand for seedlings in the province. Seed extraction, cleaning, testing and storage is also carried out at the Pine Ridge nursery. In 1983-84 over 50,000 kilograms of seed were added to its seed collection, a 10-year supply valued at over $10 million.

Alberta has taken a conservative approach to the composition of its new forests. At present only seed from within 75 kilometres and 150 metres elevation difference of the reforestation site is used. Seed collected from trees with outstanding characteristics is used in more intensive genetic selection work carried out at the Pine Ridge Nursery.

"We have learned how to crawl but we are now in the process of learning how to walk," says Kare Hellum, professor of forest science at the University of Alberta. "We are learning how to put trees back where they used to grow and now what we have to learn is how to tend those trees so that they don't die before they are properly established. And the whole system is in revolt against this additional cost because it's a very expensive part of forest management."

James says that there should be more followup, especially on planted stock. "They are simply abandoned to Mother Nature . . . There's significant up front investment with no ongoing monitoring."

Dr. Hellum thinks that planted stock may not be surviving as well as people think, citing two studies in the early 1970s that found that planting or aerial seeding was only 30 per cent successful. On first cuts Dr. Hellum feels that natural regeneration from adjacent stands is filling in where the planting is not succeeding. He warns that the rate of regeneration on second cut areas may be significantly less because there will be no adjacent mature forests to help rejuvenate the cutovers. "I would like to have someone prove me wrong."

Forest regeneration was variable across Canada between 1975 and 1980, ranging from 3.8 per cent in Quebec (where the largest area was harvested), to 39.6 per cent in British Columbia and 77 per cent in Alberta.

He says that although the seedlings produced by the provincial nursery are good, they could be improved using more field evaluation. Dermott says that the seedlings produced today are of higher quality and planting is better. "Our survival is much higher than in the earlier years, resulting in some good plantations," he says.

ALBERTA FOREST SERVICE

The guidelines and regulations for regeneration should be extended to include care of the stands until they reach the "free to grow" stage, says Dr. Hellum. "We have to agree among ourselves that a tree is not established until it has reached a certain size, that it's above the immediate competition and there are enough trees per hectare to restock the area. We should have the option of intervening if serious things like diseases and insects should interfere with what we are trying to do. We should know in fact that the crop is on its way."

Methods of forest tending such as brushing, thinning and fertilizing are not yet widely used in Alberta. "Stand tending in the regenerated stands has the advantage of creating evenly spaced trees of a more uniform size and better quality. You can harvest the second crop at an earlier age," says Wright. He adds that it would be ideal to do commercial thinning for pulp at age 50 years and cutting for sawlogs at a later stage.

St. Regis stands are surveyed three years after planting and again about age 15 years for further treatment, such as juvenile spacing, he says. "We have done about 1,000 acres (400 hectares) per year of stand tending and will be increasing that in areas that have an excess of 3,000 trees per acre (7,400 trees per hectare) and are about 15 to 20 years of age. We send in crews with clearing saws to leave the best trees and cut the smaller ones."

Alberta Forest Service's Ferdinand acknowledges that there is much room for improvement in the after-establishment care phase. "That's the key area now. That's where we get into gardening . . . . We're trying to institute a program to determine if we are growing the forests we want."

Susan Bramm is the freelance researcher for *Environment Views*

Jim Wilson

Harvesting the Resource

From swede saws to massive harvesters

In earlier times logging was a simple thing. An operator moved into an area where he had a federal government permit to cut down trees for lumber or other uses. By today's standards, equipment was relatively simple — and in fact was frequently *very* simple: a swede saw, some rope or chain and a few horses.

In today's terms, the operator "creamed" the forest — he harvested only those trees which served his purpose. The rest were left in place, although no particular care was taken to assure their good health.

But increased demand and heavy equipment changed all that. And in today's forest harvesting world, the enormous machines are economic to operate only if they're cutting away at the huge blocks of timber - and cutting it all to the ground, just like a field of wheat cut to stubble.

The process is called "clearcutting", since what happens is just that: a block of trees is totally harvested, cleared out, leaving only the ground and the scraps. And it leaves large "holes" in the forest landscape.

But, we do need to harvest the trees – and with today's much more enlightened forest management procedures, we actively plant a new crop for "next year" — which, in tree terms, is 60 or more years from now.

"Years ago, most cutting was done on a diameter butt basis," says Arden Rytz, general manager of the Alberta Forest Products Association, who has been part of the Alberta forest industry for more than 35 years. The result was a lot of 12- to 16-inch-diameter stumps, with all same-size (and therefore same-age) trees taken out of the logging area.

"That created a jungle," he says. "It wasn't very good practice, it opened the other trees up to windthrow and tended to make the area prone to insects and fires. For years and years there wasn't too much reforestation, and the coniferous species were often choked out by other growth.

"But now we have clearcutting, and I think that's one of the biggest steps forward we've ever had in the Alberta forests. It's given us the opportunity to re-establish the crop and do some forest management."

In clearcut harvesting, regulations provide that only 50 per cent of the trees in a given area can be cut at a time. This results in a harvesting system in which a forest area is cleared in two operations, or "passes", which must occur at least 10 years apart. During that 10-year hiatus, the logging operator must ensure reforestation of the cut block, either by planting seedlings or by encouraging natural regrowth. The adjacent 50 per cent of more mature trees not harvested in the first pass can only be cut when the reforestation trees are six to eight feet tall and the new young forest is thriving.

Ken Fairhurst, who has the interesting title of "landscape forester" in Alberta Energy and Natural Resources' timber management division, says he is convinced that with appli-

Loading logging truck, Whitecourt area

cation of proper forest management techniques, clearcutting does not need to pose any environmental or esthetic problems.

Ken Fairhurst

"In the Alberta government ground rules there has been a recognition for several years that esthetics are important in all forestry considerations, and that visual impacts of cutting should be minimized," he says. "In the past that has been handled quite effectively by our field foresters, but we're now starting to take a much more active stance in this area.

"What we're doing is determining what is of particular visual significance in each area. Some areas you could pass by without noticing that trees had been cut — or perhaps people normally wouldn't see them because of their location. In other cases, there are important natural features that will be changed if trees are cut.

"We're making an inventory of all areas that might be harvested, considering transportation corridors, recreation spots, communities — everything. Then we'll concentrate on those important spots in visual management, or what used to be called landscape logging. Planning the harvesting operation, reforestation, rehabilitation — even adding to scenic benefits will all become acknowledged and involved," Fairhurst says.

Alberta forestry regulations require that a logging company file an overall operational plan before it starts cutting trees (in compliance with its forest management agreement or quota certificate), and also annual operating plans thereafter. These plans are checked by ENR and other government agencies, and Fairhurst says it's particularly at those times when he becomes involved. Cut blocks range from a hectare or so to up to 100 hectares, but average around four or five.

In today's forest harvesting world, the enormous machines are economic to operate only if they're cutting away at huge blocks of timber — and cutting it all to the ground, just like a field of wheat cut to stubble.

To make the impacts as slight as possible, he says, it's expected that the cut blocks should generally avoid steep hillsides, checkerboard patterns and any particularly ugly slashes. "Straight edges don't often blend well on a rolling terrain," he says, "so we try to make them uneven, with curved edges that follow the contours of the land."

A variety of techniques is used, including painting in changes on photos to show what the cuts will eventually look like, before the harvesting operation is approved.

However, Fairhurst cautions, "landscape forestry is not designed to tie up timber or make it more expensive to log. Done properly it can actually open up areas that *seem* to be too sensitive to be logged, and it can also improve utilization and recovery of timber in the area because we often find bits that can be added effectively to the cutting area. And at the same time we can minimize most visual and environmental impacts the operation might have."

Bob Udell

Proponents of clearcutting also consider it the least-damaging harvesting technique in terms of environmental impacts, although most accept the criticism that without careful visual management, its results can look pretty distressing.

River siltation can result from clearcutting operations near stream beds. Don Frengren, director of program co-ordination for ENR's Alberta Forest Service says, "It's generally the roads that the operator has to cut to get the timber out that can contribute to stream bed siltation. We have some pretty strict rules governing how roads should be built and because of that we don't have many problems. When we do, penalties can be — and are — applied, and repairs we order are carried out."

Millar Western Logging, Whitecourt

ALBERTA GOVERNMENT

Environmentalists, however, are less enthusiastic about clearcutting as a harvesting technique.

"In some cases to maintain a recreation and protected wildlife habitat you simply have to alter forestry practices," says Diane Pachal of the Alberta Wilderness Association. "Sure, there are some areas where it doesn't likely matter as much. But think of the Eastern Slopes, where there's all sorts of competition by wildlife and recreation demand."

Pachal echoes an Environment Council of Alberta report in saying, "What we'd like to see is a three-cut or four-cut system where timber harvesting is permitted, so that fewer of the trees were taken out at any given time. There should be smaller cuts, not the huge ones we sometimes see — small patch cuts are better for natural seeding and they're less visually bothersome.

"And," says Pachal, "we think some areas should be declared off-limits for logging, and in the rest of the forests it should be accepted that there will be careful consideration of balances between the obvious need for harvesting and the competition for the same area by wildlife and recreation."

Dave Sheppard, a Pincher Creek environmentalist, is concerned that clearcutting and scarification may be leaching nutrients from the soil, thus hampering reforestation. "When you disturb the surface with scarification the organic matter is worked up and exposed more to the sun," he says. "Decay is speeded up and there's a rapid release of nutrients into the the groundwater — and then it's flushed away.

"The claim is that wildlife isn't affected by clearcutting because the open areas provide food and the surrounding tree areas still provide protection. But is has been my own observation that at least in the case of the ungulates (hooved animals) they're too frightened to go into the middle of (large) clearcuts — so there's a period of 10 to 20 years when they lose the use of the land."

Sheppard is also distressed by the lack of Alberta research material or existing studies designed to determine the impacts of logging on the province's forests.

"Until we know what's happening, if we have to have forest harvesting we should limit it. The key here is zoning — some areas of good timber set aside for good forest management, others which would permit selective cutting, and others where no cutting could take place. And cuts should be limited to 10 acres or less."

Both industry and government react strongly to the concept of smaller cuts and three or more visits to the same stand of timber. "We have very few cuts larger than 40 or 50 acres," says ENR's Ed Gillespie. "The more times you go into an area, the more opportunities there are for environmental damage. Clearcutting reduces road costs — but the smaller the blocks, the more roads you have. More cuts might be feasible, but it would depend on the area, the likelihood of damage and of course, the return to the operator."

And there's one more concern, that economic pressures might persuade the Alberta government to relax what is currently considered the best forest harvesting system in Canada.

Arden Rytz is convinced it is not likely to happen. "For the foreseeable future we're in a position where we can easily maintain our markets within our existing annual cut limits," he says. "In other words, there's a larger supply of timber we are permitted to cut than we're selling — so while there's lots of competition for sales, there's not the same competition for available timber as there is in other places.

"We've also spread out the industry now and it's pretty well in balance throughout the province, with room to expand in most areas. And I would doubt like hell the government would ever let us get into an overcut situation here anyway."

Jim Wilson, a former journalist, is a Calgary freelance writer

Sharon Adams

Forest Protection

"Many of those trees were my friends, creatures I had known from nut and acorn; many had voices of their own that are lost for ever now. And there are wastes of stump and bramble where once there were singing groves. I have been idle. I have let things slip. It must stop? I will stop it!"

- The Ent, Treebeard from Lord of the Rings

It took an all-consuming war between good and evil to rouse Tolkien's Entish treeherd to action. But Alberta's army of treeherds is already assembled, armed, trained and ready to strike — for each of Alberta's great forests is under constant attack.

Fire, insects and disease are the major foes, but they have enlisted allies in drought, lightning, winds and humans.

Alberta has developed an almost military response to threats to the forest, a justified response, says Paul Addison a research scientist with the Canadian Forestry Service's Northern Forest Research Centre in Edmonton. "Forestry is too big a resource in Canada, and we rely on it too heavily not to be sure."

Two and a half million hectares of forest were destroyed in the severe fire season of 1980-82. It cost $170 million just to fight the 4,100 blazes.

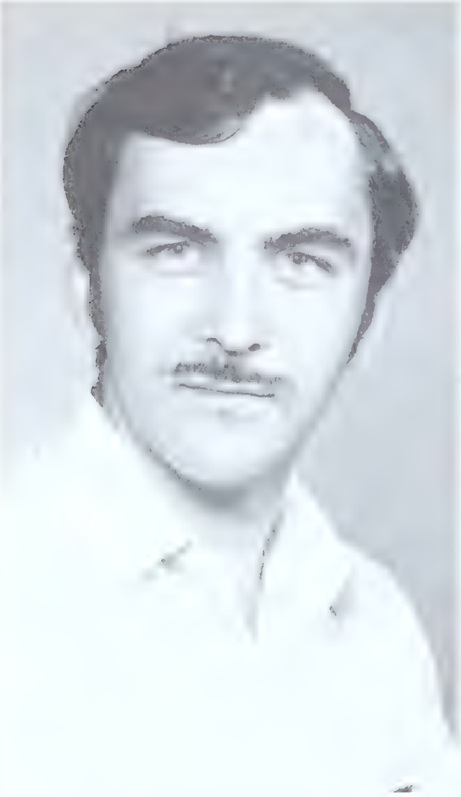
Though the Alberta Forest Service could follow Treebeard's example as a protector of the forest, it could not adopt his motto: Do not be hasty. In the real world, seconds wasted means forest lost. In 1983 the service was given a 130-per-cent budget increase to develop better fire detection and response techniques. The result: Response time was cut from one hour in 1980 to a bare 15 minutes in 1984. Cliff Smith, director of the Forest Protection Branch of ENR, reports "an excellent year" in 1984 — despite widespread drought conditions (in a 10-day span beginning in late July, 600 fires started).

"We had an unusual number of fires, and we lost almost nothing of any consequence. The majority of the fires were contained on initial attack. We're very, very pleased," Smith says. Although the 1,370 fires burned 95,000 hectares only 15,000 hectares of it was marketable timber.

The 1984 bill for fire detection and suppression was $22 million but without the new early detection and quick response techniques, Smith estimates suppression costs alone would have been $50 million — with losses topping $200 million.

The fire protection system is complex: as the fire danger increases, it's decided whether to pour on resources to ameliorate losses. Not all fires are fought, Smith says. Fires that threaten human life and habitation are top priority. After that, the decision depends on the kind of timber threatened, the forest watershed, or whether the timber is marketable. Priorities differ from forest to forest. South of Grande Prairie, marketable timber

Water bombing a forest fire in the Swan Hills area (right)



Paul Addison

is a priority; in Kananaskis Country, esthetic value is important; in the north, "if we can't stop a fire on initial contact, we often let it burn" since the timber is not marketable, the soil is poor and there is little habitation.

Protection begins with prevention. Hazard engineering is an important part, reducing fuel that feeds fire. Patches of dead trees and windfalls are destroyed by controlled burning or by cutting. Deadfall and debris are now being removed along the Kananaskis Highway to be piled and burned this winter.

But understanding what causes fires is equally important. On average, 55 per cent of Alberta's fires are started by people. Education helps cut that percentage. So do patrols of activities likely to cause problems.

For example, farmers are enticed by clear, calm spring days to use fire to clear their fields. Often stiff chinook winds blow the fires out of control. In 1968 three farmers clearing land started such a blaze. Pushed by wind, the fire jumped the Athabasca River and travelled the 110 kilometres between Vega and Slave Lake in two days.

So the service keeps tabs on the forest and oil and gas industries, railroads, Indian reserves, farmers and heavily-used recreational areas during fire season.

Lightning is the second major cause. Normally starting 45 per cent of fires, it sparked 65 per cent in 1984 — at least 890 fires (some are put out by rain before they take hold).

Immediate detection and quick response are important to cut fire loss. In 1983 the AFS invested $600,000 in a lightning detection system. Its seven direction finders can detect lightning ground strikes anywhere in the province, and Smith says there are " a phenomenal number" of such strikes — up to 15,000 a day during storms; 200,000 ground strikes a year.

The direction finders send information on lightning strength and position to a central computer in Edmonton, which in turn relays it to the 10 field headquarters in the province's main forests.

"The important thing to realize is it's only a tool — it doesn't put the fires out," Smith says. Decisions on how quickly and strongly to respond depend on the amount of fuel to burn, the weather, moisture, and fire hazard rating.

On average, 55 per cent of Alberta's fires are started by people. Education helps cut that percentage.

Under moderate fire hazard, an aircraft may follow a lightning storm. If a fire is spotted, a firefighting team can be dispatched quickly. If the hazard is extreme, helicopters carrying teams of firefighters follow the storm. When a fire is spotted, the team can be landed, or if there's no landing site, fighters can rappel down ropes from the hovering helicopter.

Though fire is a major foe, there are other enemies — hordes of insects, pests and diseases.

But one battle seems to be won. The mountain pine beetle, which has devastated hundreds of square kilometres of forest in the southwest and Cypress Hills, is nearly controlled.

Cliff Smith

Herb Cerezke, a Canadian Forest Service entomologist, reports steadily declining numbers of destroyed trees — from 500,000 in 1982 to 100,000 in 1984. The infestation is expected to be limited to isolated pockets in the Porcupine Hills and Kananaskis in 1985.

The insects spread from Montana and British Columbia, finding ideal conditions for a population explosion in Alberta: appetizing forests of aging pines (the beetles prefer to nibble on older trees), mild winters and helpful chinook winds to waft them from destroyed forests to greener areas.

The pests were first noticed in the Waterton Lakes and Bow-Crow forest in 1977, where they'd left telltale patches of reddened, dead trees. By 1979, Alberta had a major infestation. Today more than 80 per cent of the lodgepole pine in the Waterton Lakes district has been killed by the beetle.

In July and August, the female bores into a living lodgepole or limber pine tree and burrows out a narrow chamber in which to lay her eggs. She carries in with her another pest, a blue-stain fungus which immediately begins to attack the tree. The tree begins to slowly starve. The larvae hatch and begin to eat, severing the bark from the stem. The fungus completes the job by killing the living cells in the inner bark, choking off the tree's nutrient and water supply.

The next year, the young beetles chew their way out of the bark in huge numbers,

to mate and find new host trees.

The beetle is difficult to control because it spends most of its life hidden by bark. The only practical method of preventing beetle spread is to remove infected trees before the adults can emerge.

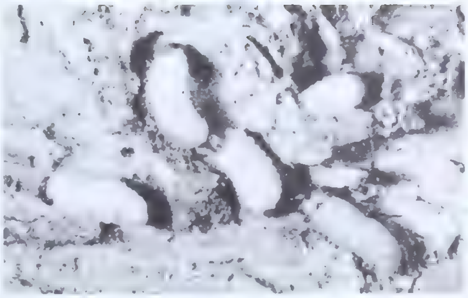
In 1979, Alberta began to salvage lumber south of Highway 3, and launched a $4 million control program north of the highway.

Garry Leithead, Revelstoke Companies' chief forester, says clearcut salvage operations on timber leases began in 1979. Timber was clear cut because "the beetle doesn't attack the whole stand at once" but over three years. "If you wait, a major component of the wood is already gone."

The longer the period between the infestation and processing of the timber, the less wood is commercially salvageable. The blue stain reduces some product grade, but the biggest detraction is cracks in dead wood which reduce the number of boards which can be cut from a log. Old, dry, dead trees can only be used for firewood.

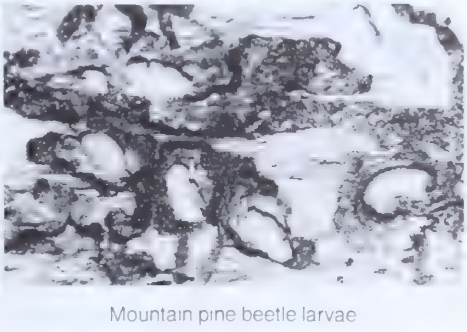
Though not opposed to selective cutting for beetle control, Dave Sheppard, former president of the Pincher Creek-Crowsnest chapter of the Alberta Wilderness Association, criticizes the clearcut salvage operation. He says the cuts are unsightly and detrimental to wildlife, which for up to 20 years will use only the edges of the area. Also, scarification results in erosion of the thin soil and increased decomposition of organic material, decreasing soil fertility.

As well, he says, companies unnecessarily remove mature stands of spruce along with the infested pine, simply "because it's cheaper."



Engelmann spruce beetle larvae

Spruce bud worm



Mountain pine beetle larvae

CANADIAN FORESTRY SERVICE — NORTHERN FOREST RESEARCH CENTRE

The mountain pine beetle, which has devastated hundreds of square kilometres of forest in the southwest and Cypress Hills, is nearly controlled.

But Revelstoke's Leithead argues shallow-rooted spruce were removed to reduce windfall.

Art Peter, Bow-Crow forest superintendent, says "clearcutting reduced the fire hazard, and destroyed billions of beetles which couldn't infest other stands."

Salvage operations were bitterly opposed by some residents who feared denuded hillsides, stream silting and reduction of water quality and quantity. After months of debate, the province decided not to salvage Scarpe Creek forest.

"I flew over it yesterday," Peter says. "It's now a grey forest. There were several million feet of merchantable timber there. It's

Fire as an Ally

A forest management technique used by Alberta Indians as long as 15,000 years ago is being resurrected as a cheap, efficient tool for modern forest management.

That tool is fire.

Paul Woodard, associate professor of forest fire science at the U of A, says "fire can be used like a surgeon uses a scalpel" to control disease, increase habitat and improve the forest.

Ken Crutchfield, fish and wildlife's habitat development head, agrees, but says to gain widespread use, "we have to change the Smokey the Bear attitude" that all fire is bad.

To Henry T. Lewis, a University of Alberta anthropology professor, that would be not so much a change in attitude as a revival of a tradition of Alberta Indians for as long as they've been here.

But it is a vanishing tradition.

"Indians have a folk theory about the role of fire that has many parallels to the new field of fire ecology. They wanted a fire mosaic, leaving a patchy forest at various stages of growth." Such a forest is not as susceptible to fire, disease or insect pests, which do best in large stretches of trees of the same age.

Initially Dr. Lewis found few Indians who recollected the practice. Then "I realized I was talking to people middle-aged or younger," who were not likely to remember or to have heard about pre-Second-World-War burning. In the mid-'70s a grant allowed him to research in native communities where he found "the further north I travelled, the younger were the people who remembered." In visits to Indian reserves and Metis colonies from Grande Cache to Frog Lake, he eventually contacted 55 elders who remembered — or still practiced — controlled burning.

The tradition was found in virtually every tribe, though most no longer practice it. "We know all Indians in North America were using fire at the time of contact (with Europeans) to manage habitats," and many aboriginal peoples throughout the world use it today.

Alberta Indians used controlled burning to encourage certain kinds of vegetation, to attract animals and as protection from fire.

"They knew the relationships between plants and soil types" and the animals attracted to those plants. They burned meadows in the spring, before the grass regenerated and while the subsurface was still frozen, to encourage growth of grasses to attract animals and birds they hunted or trapped. When the mat of dead grass was burned off, foxes were able to hunt better and trappers could get at the foxes more easily.

Burning around lakes and swamps prior to nesting season was "like mowing the lawn." It built up the roots of plants eaten by ducks and geese, increasing their numbers. Getting rid of the matting of grass also improved the habitat.

They burned to open up the canopy in the forest and to attract species they hunted. A few hours after a burn, Dr. Lewis says, moose would come in to eat the burned brush for its sodium. A week later, deer and elk would be attracted to the new grass growth.

Women, who traditionally contribute to the tribal economy by gathering, used controlled burning to stimulate berry growth.

Controlled burning was also used to create fireguards. Over a period of two or three years, deadfall forest would be cleared of its "drunken trees" which formed a barrier in the forest and posed a fire hazard. Indians frequently burned off the fuel around settlements to forestall wildfire damage. "I suspect the fires were much less intense 100 years ago because of the light, frequent prophylactic burning. In the last 70 years, we've allowed fuel to build up."

The burning which helped the Indians maintain and control their environment also made encroachment of European settlers easier. Forest cleared to create meadows or increase hunting range was that much easier to convert to farmland.

Today controlled burning is being investigated by forest managers as a means to improve wildlife habitat, control insect infestations and clear the forest of deadwood.

Crutchfield says fish and wildlife has been developing fire as a management tool since 1971 and says "we would like to become more active."

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all dead now." The timber will take 20 years to regenerate, during which time it will be a fire hazard, he says. Meanwhile, of the 4,050-hectare salvage area, all but 46 hectares has been reforested.

North of Highway 3, the control program has reduced the beetle infestation to small pockets in the Porcupine Hills and Kananaskis, says Dr. Cerezke. Though the major battle appears to be over, the beetle is endemic, and the only long-term control lies in "making sure the susceptible timber types are not there." Alberta cannot change the species mix, because few species thrive in the area, but it can use successive planting, so trees will mature at different times, limiting the number of palatable trees.

Silviculture is also the key to control of the minor outbreaks of other pests and diseases plaguing Alberta forests.

Chief among these is the dwarf mistletoe, The first burn was in the Willmore Wilderness Area, south of Grande Cache to Jasper National Park and west to the provincial border, where poplars and willows simply grew too tall for browsing animals to reach. A controlled burn "opened up the forest canopy and brought the forest back to an earlier vegetative state."

Since then, three other areas have had burns for habitat improvement. Crutchfield reports "phenomenal" response from the 16-hectare burn on Ram Mountain in 1983, where windblown timber had been steadily encroaching on bighorn sheep range. "After the burn, the sheep went on the range almost as quickly as it cooled down."

Burning on islands in a lake near Edson removed unwanted vegetation and established habitat for Canada geese and other waterfowl. As a fringe benefit, deer have been crossing the frozen lake in winter and using the islands for winter browsing.

While vegetation can be removed by other methods, Crutchfield says controlled burning is efficient and cost-effective. It will "at least halve" the costs of clearing 230 hectares of land of Kbass Flats in the Willmore Wilderness Area. Mechanical clearing of the land would cost about $500 per hectare, but burning can reduce that to less than $245.

Mechancial clearing would require a bulldozer, operator and supplies for well over a week "just to knock it down." After the clearing, animals may avoid the area because of the noise during clearing. The piles of deadwood left behind would be a fire hazard until cleared away.

By contrast, a controlled burn done in stages over a week leaves no debris. Though it might require 15 to 20 workers for two of those days, the work is largely done by volunteers from the Alberta Forest Technology School in Hinton.

Cliff Smith, director of the Forest Protection Branch, says controlled burning is "something we're only starting to use." Last summer the branch tried a broadcast burn of a hillside in the Porcupine Hills area, now being attacked by mountain pine beetle.

It wasn't entirely successful, he said, because the fire did not spread.

— *Sharon Adams*

Burning to maintain waterfowl habitat around northern lake (left)

Dwarf mistletoe clumps on jack pine (below)

a parasitic plant which infests large tracts of lodgepole and jack pine in northeastern Alberta, disfigures and reduces the size of host trees. It can be controlled by destroying affected trees.

Bob Miyagawa, head of AFS's liaison and analysis section, reports endemic spruce budworm in the Slave Lake, Wabasca and Fort McMurray areas is controlled by selective cutting.

Spruce bark beetle, which attacks trees in much the same way as does the mountain pine beetle, has affected about 2,000 hectares of forest near Footner Lake and Peace River over the past five years. Its effect is minimal since it prefers weakened, older trees as hosts.

Other pests include pine stem rusts, whose cankers can stunt, disfigure and kill trees; decay organisms which attack non-commercial aspen; cone rusts, needle diseases, root rot, root collar weevils and saw flies.

Alberta's treeherds are vigilant, responding not only to current dangers, but anticipating new ones — particularly from industrial pollution and the side effects of silviculture.

Dr. Addison says the Canadian Forest Service branched out to include pollutants in forest protection studies in the mid-'70s and anticipates the field will grow as more herbicides are used.

"We're at a very early stage," he says. "We're dealing with a series of symptoms and don't have the history. It's like a doctor looking at a new (human) disease for the first time."

But early indications are heartening. Effects of pollutants from Alberta's major industries — oil sands and sour gas plants – seem to be localized, and industries are co-operating to ameliorate damage.

Results from 1975-76 studies show "merely local impact" from oil sands plants on lichens less than a kilometre away. And lichens, he says, are notoriously sensitive to changes in the environment.

A 1981 study showed "local, dramatic effects" of elemental sulphur pollution from two Rocky Mountain House sour gas plants. It eliminated the understory — the mosses, shrubs and herbs under the trees within 500 metres of the source. There has been no measurable effect on trees, indicating "either the trees aren't affected at all, or there's a long-term effect."

The CFS is concerned with long-term effects of pollution and forestry practices. In 1983, it established a National Early Warning System to chart long-term effects of toxic substances at 100 sites across the country. Seven of those sites are in Alberta two each in Fort McMurray and Rocky Mountain House and one each in Waterton National Park, Cypress Hills and Grande Prairie.

In Canada's rush to improve the forests, Addison says, "there's tremendous pressure to use every tool we can. We have to be careful we don't destroy the capability of the land to support the forest."

The goal of its study of the environmental effects of toxic substances and vegetation management, which Addison heads, is to develop compatible silvicultural, environmental and economic forestry techniques.

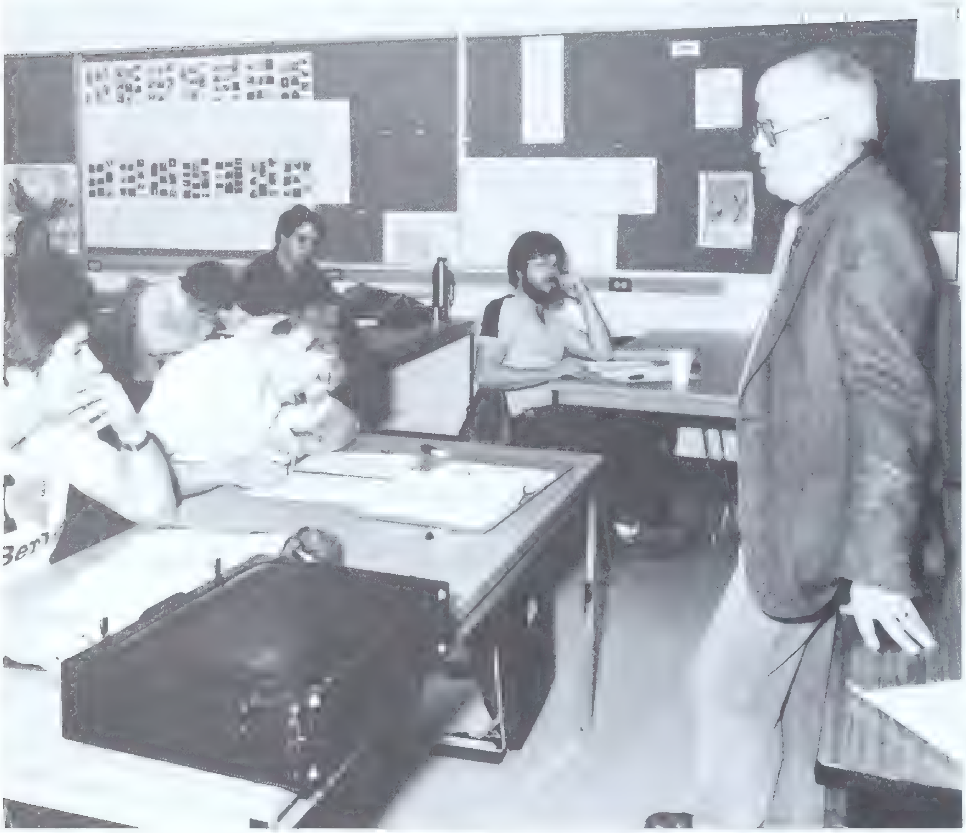
"We're not anticipating the widespread problem of the east or Europe, but we owe it to the people of Canada to identify if these things start happening."

Sharon Adams is a Calgary journalism instructor and freelance writer

Scot Morison

Education and Research

The making of experts and expertise



Mike Lalor with a NAIT forest technology class

FRED KATZ

Healthy forests and healthy forest industries depend in the final analysis on the quality of the people who make trees their careers.

Alberta is fortunate in having quite an extensive system of post-secondary education in the wide field of forestry, from highest academia to basic technical training.

Established in 1970, the University of Alberta's department of forest science is the youngest of Canada's six forestry schools. (The others are found at the University of British Columbia, Lakehead, the University of Toronto, Laval and the University of New Brunswick.) In spite of this, Peter Murphy, associate dean of forestry at the U of A, feels his school is one of the very best.

"I think we're ranked right up at the top, and I say that as objectively as I can."

Although forestry is only 14 years old here, it shares a faculty (the faculty of agriculture and forestry) with a number of other well-regarded departments, some of them considerably older.

"Forest science is very much a faculty program here," says Murphy. "We've always drawn heavily from people in existing disciplines — soil, plant and animal scientists, entomologists, and economists." This pooling of knowledge is in keeping, he adds, with the "inherently interdisciplinary" nature of forestry.

When the U of A's undergraduate program was started in 1970, established forestry schools were primarily concerned with timber production. In contrast to this, and with considerable foresight, the educators and administrators involved in mapping out a curriculum for this new kid on the block worked to strike a balance between the timber and non-timber aspects of the forest resource. The founders of the U of A school wanted the graduates of their four-year B.Sc. program to be fully qualified both as foresters in the traditional definition, and as integrated forest resource management professionals.

At the graduate level, the U of A has operated a masters program since 1975. There are currently 48 students working towards an M.Sc. in either forest science, or forest science (wildland recreation). The department was granted authority to administer a doctoral program in 1981, and there are now 14 Ph.D students enrolled. A few of the areas of specialization available at the graduate level are integrated forest resource management, forest genetics, silviculture, wildland recreation, environmental interpretation and forest fire management.

The Northern Alberta Institute of Technology in Edmonton is also producing a crop of skilled personnel, forest technicians. NAIT's 20-year-old forest technology diploma program has an annual enrolment of 75 students. According to program head Mike Lalor, graduates are equipped to handle the practical operational needs of the forest industry and government forest service.

"We teach the central core of forestry," says Lalor. "We provide instruction in timber management — that is, how to manage a forest for sustained yield — extraction and reforestation procedures, stand tending and stand maintenance."

The first year of this two-year program is taught at NAIT, the second at the Forest Technology School in Hinton. Operated by Alberta Energy and Natural Resources, the technology school offers more than 50 short courses in forestry and resource management a year to government people and interested others. The school has also provided forest fire fighter training to about 7,000 individuals since 1964.

There are other post-secondary educational programs around the province as well. Grande Prairie Regional College offers a 10-week pre-employment woodlands training course that covers such ground as power saw operation. The Alberta Vocational Centre at Lac La Biche has a six-month forestry

Peter Murphy

crew worker training program designed to prepare its students for jobs in several forest management areas. Finally, Lethbridge Community College's department of environmental science offers two-year diploma courses in renewable resource management, conservation enforcement and recreational lands management.

Research is one of the most important functions of experts in any field. The pushing of knowledgeable people at the frontiers of existing knowledge in a systematic fashion is the primary force in the progress of any science. Here in Alberta, those frontiers in forestry are being worked at by scores of people in the University of Alberta, Canadian Forestry Service, Alberta Forest Service, and other provincial government bodies.

Evidence of the substantial research effort at the U of A, says Murphy, is the large number of graduate students at work there.

"That we have that many grad students is an indication of the scope of research possibilities opened for them by our staff," he observes. Among the most interesting of the many projects under way at the moment are: a major forest genetics study aimed at, among other things, determining the effects of micro-habitat on the genetic makeup of forest trees; computer model work on optimal harvest scheduling in forest management; research into tree growth and physiology vis-a-vis the so-called greenhouse effect; and research into the science and management of fire. Support for U of A research comes from a number of places, most notably the Alberta Forest Service's Forest Development Research Fund, the Canadian Forestry Service's Block Grant program, and the Natural Sciences and Engineering Research Council.

Dave Kiil

Opened in 1971, the Northern Forest Research Centre in south Edmonton is regional headquarters of the Canadian Forestry Service for all three Prairie provinces and the Northwest Territories. According to Dave Kiil, regional director of forestry for the Canadian Forestry Service, and head of the facility, the NFRC spends approximately $7 million annually on forest research in its zone of operation.

"We try to arrive at a mix of basic research and attending to the needs of industry, government and the universities," notes Kiil, "and we're now putting more effort into getting the information *out*, as in technology transfer."

Joe Soos

Most NFRC research falls into three broad categories: environmental forestry, forest resources and forest protection. Studies in progress include:

- in the environmental forest category, the monitoring of effects of various air pollutants on forest species;
- in the forest resource category, the development of silviculture models for increasing the yields of the most commercially important trees in the Prairies; and
- in the forest protection category, the surveying of "important pests and conspicuous forest damage" (conducted annually).

Among the centre's major accomplishments to date, says Kiil, are the implementation of a new forest fire danger rating system and the compilation of a data base of performance characteristics of the various silviculture equipment available in the market for industry.

Another group of active researchers is the staff of the Alberta Forest Service's Forest Research Branch, under director Joe Soos. The AFS has been involved in research since 1974, but the branch itself is only four years old.

"We're into mission-oriented research for the overall improvement of forestry and the forests," comments Soos. "We try to come up with solutions to some of our present, middle-term and long-term problems."

The Forest Research Branch's annual research budget of roughly $1 million is split almost equally between in-house projects, and awarded contracts and grants to outside scientists and graduate students.

In-house work is concentrated in three areas right now, says Soos: toward the

Educating the Public

Junior Forest Wardens

"Everything we do is directed towards increasing the general public's awareness of the forest resource," says Dave Kiil, president of the Alberta Forestry Association, an alliance of professional foresters, environmentalists, educators and government officials.

"As a group we get the benefit of various viewpoints among our membership, and I think that allows us to provide a balanced appraisal of the issues in forestry today."

The AFA is affiliated with the 76-year-old Canadian Forestry Association, one of the oldest conservation organizations in the country. Though the Alberta group is itself several decades old, it was really just three years ago it began to assume a high profile in public education. Since then, the association has launched a number of interesting projects, all of them aimed at public consciousness-raising.

Alberta Trees of Renown (see page 14) is intended to create a permanent honor roll of the province's unique trees. Albertans are invited to participate by nominating individual trees for inclusion in the honor roll.

Another of the AFA's programs is its Speakers' Bureau. A roster of some 25 forestry experts have volunteered their services as guest speakers to various chambers of commerce, service clubs and other interested groups. Harold Sellers, associate director of public affairs for Alberta Energy and Natural Resources and one of the initiators of the Speakers' Bureau, says the public response to the program has been excellent.

"They (the audiences) find the story of forestry quite an interesting one, but judging by the questions they ask, most of them don't realize how important the forests are here in Alberta."

If the forests are to remain a renewable resource, tomorrow's decision-makers – today's children — must receive special attention in the process of consciousness-raising. Thus, school programs are a key part of the AFA's mandate.

For years, until his retirement in 1982, the lion's share of educating the province's children in the importance of the forest lay on the broad shoulders of conservation officer Greg Stevens. It is estimated that Stevens logged better than 200,000 kilometres and spoke to more than a million students in his 20-year career as unofficial Mr. Forestry for the AFA.

New in Alberta schools at the Division Two, or grades four through six, level are a series of three slide-tape presentations: *Trees and Other Things, Friends of the Forest* (forest management), and *The Tree Garden* (reforestation). The production of these audio-visual packages and related literature was supported by a $35,000 grant made to the AFA by the provincially-funded Recreation, Parks and Wildlife Foundation of Alberta.

Newer still is the Forever a Tree project. This program, tentatively set to get off the ground as part of this year's National Forestry Week in May, will serve both to educate and beautify. Division Two classes will be able to apply for up to 20 nursery-grown trees for planting around their school yards. The AFA hopes to involve 50 schools this first year, and raise that number to 250 by 1988. The trees for the project will be joint contribution from Alberta Agriculture's Oliver Nursery, and the Alberta Forest Service's Pine Ridge Nursery.

For the past 30 years, Alberta Agriculture has given away tree seedlings to Grade One and Grade Two students for Arbor Day in May. About 35,000 Colorado spruce seedlings are sent to interested schools from the Oliver Nursery each year.

The Alberta Forest Service is also involved with children through its Junior Forest Wardens and Junior Forest Rangers programs.

The Wardens, a national program, teaches youngsters aged 7 to 18 such basic forestry skills as tree identification and campfire safety while at the same time providing them with exciting activities like white-water kayaking and winter camping. The current membership of over 2,000, in clubs from Fort Chipewyan to Lethbridge, marks a four-fold increase in participation since 1980, says Bill Bresnahan, AFS supervisor of the Wardens and Rangers programs. This is an impressive statistic given the current waning interest in many other youth groups.

"We capitalize on the adventure aspect," say Bresnahan of the recently revamped Wardens. "Whereas in the past we were a church-basement-type of program with the kids studying to earn badges on tests, we've now made it much more experiential. The kids get outdoors for some project-based, hands-on experience, things that let them say 'I did it'."

The Junior Rangers, on the other hand, is a work experience program. Last summer it provided gainful employment for more than 200 16-, 17- and 18-year-olds. Rangers help in practical forestry labor (e.g., trail and park construction, brush thinning) in various sites around the province. Moreover, while working for wages, the students also acquire many useful forestry skills. The whole experience helps some of them make up their minds about careers in forestry and resource management, Bresnahan says.

Children and adults alike are the intended audience of the AFS's other public education efforts. In the tall trees at Hinton, the AFS operates a museum dedicated to the history of forestry in Alberta. At Smoky Lake, conducted tours of the Pine Ridge Forest Nursery are available to interested groups, and at the Kananaskis Forest Experimental Station there is a major forest management interpretive trail where visitors can see for themselves examples of forest management technique. And, of course, in addition to all this, there is also the AFS's cheerful media spokesman, Bertie Beaver.

— *Scot Morison*

Probably the most significant development to take place has been the creation of a federal ministry for forestry. This should serve as both a morale booster, and a promise of action to come.

improvement of current reforestation practices; watershed research as it relates to logging practices; and site classification and its application to management techniques. Outside research funded by the branch includes a look at the effects of water table level on tree growth, and an intriguing study of the control of snowshoe hare destruction of seedlings through the use of predator scents.

The U of A department of forest science, the CFS's Northern Forest Research Centre, and the Forest Research Branch of the AFS are not islands unto themselves. Murphy, Kiil and Soos all stress the importance of inter-agency co-operation in forestry research.

"The lines of communcation are open," says Kiil. "We try very hard to work in consultation with provincial agencies, forest industries, the universities, and anyone else working towards the improvement and well-being of forests.

"We find that co-operation is really an aid to good research," agrees Murphy. "We all try to complement each other.

"Lots of individual researchers out there have the knowledge, but if that's as far as it goes, well then it doesn't do anyone any good," Soos says. "Communication is a key in technology transfer."

One group which certainly seems to have recognized the value of linkage — of joining forces — is the three-year-old Forest Products and Forest Industrial Development Research Program. This program is a joint venture of the provincial departments of Energy and Natural Resources, Economic Development and the Alberta Research Council. J.A. Brennan, ENR assistant deputy minister responsible for the forest service, chairs the program's management committee. He is enthusiastic about the economic potential suggested by some of the product research currently being carried out by the Alberta Research Council and by private consultants contracted by the committee.

"We haven't spent much money (the entire program has an annual budget of just $900,000), but we're seeing some exciting potential, particularly in the wood panel and wood chemicals areas," says Brennan.

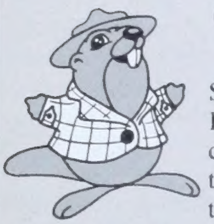
Education and research have both come in for their share of criticism of late.

In March, 1983, the Science Council of Canada released a report entitled *Canada's Threatened Forests.* Among many concerns about the management of our forest resources was the council's opinion that there are neither enough skilled foresters nor enough post-graduate forest scientists being produced in this country. Furthermore, the science council was critical of the level of research, both basic and applied.

In October, 1983, a second report added more weight to the argument. *The Green Ghetto,* written by Frank Oberle, MP for Prince George, B.C., expressed concern about the widening "brainpower gap" between Canada and her competitors in forestry, and similarly about the inadequacy of current research. Both reports seemed to point to a philosophical problem — the absence of due concern for our forest resources ("apathy", according to Oberle) — and a concrete symptom of that problem — insufficient funding.

Fortunately, criticism such as this appears to be falling on receptive ears. In the months since the Oberle and science council reports were released, some very positive things have happened — positive for research and education, positive for forestry as a whole.

The Bertie Beaver Story



"What do Mickey Mouse, Smokey the Bear and Bertie Beaver have in common? Aside from their membership in the cartoon animal kingdom, all three can be traced back to the southern California studios of Walt Disney Inc.

It was back in the late '50s that Disney came north to Alberta to shoot "Nomads of the North", the wilderness tale of an unlikely friendship between a small black bear and a husky pup. Erik Huestis, now retired, was a director of the Alberta Forest Service at the time, and he remembers being asked by the provincial government to lend his assistance to the filmmakers.

"The government asked me to look for a location for the film," says Huestis. "We found them one up in the Kananaskis country, and after that we also provided them with bears and pups."

Grateful for the help of the Forest Service, Disney asked if they might be able to do something in return. Huestis replied that the AFS was looking for a mascot at the time, but weren't particularly enamored of another Disney creation, the U.S. Forest Service's Smokey, because of the nuisance caused by bears in real life.

"We wanted a beaver, and they (Disney) asked if they might not develop him for us as a thank you," recalls Huestis. The initial AFS choice for a name was Buck Beaver, but that ran into a patent problem and Disney themselves came up with Bertie (derived from Alberta) as an alternative. The Forest Service sent Disney a dollar as a formality, and Bertie and his patent was theirs.

In the 26 years since his creation, Bertie has been a busy beaver in the employ of the AFS. He continues to be featured on park signs, in posters and publications, summer parades, and on television and radio commercials. There are even Bertie Beaver matches and ashtrays. Wherever he appears, however, his message is the same; he is there to underscore both the value and fragility of our forests.

— *Scot Morison*

Probably the most significant development to take place has been the creation of a federal ministry for forestry. This should serve as both a morale booster and a promise of action to come.

Another very important development for this province was the Oct. 25, 1984 signing of a five-year Canada-Alberta Forest Resource Development Agreement. The completion of this agreement, and others by Ottawa with Saskatchewan and Manitoba, has led to an increase in the Northern Forest Research Centre's overall annual budget from $7 million to $15 million. Kiil, head of the NFRC, says that up to 25 per cent of this additional $8 million in funding could go toward applied research and technology transfer.

"The new ministry, the agreements, and the increased funding are clear signs of a commitment to forestry by the federal government," says Kiil.

At least for the present, the changes are being received here with guarded praise.

"I'm more optimistic about the future, but cautiously so," says the U of A's Murphy, who was quoted in the Oberle report as being "appalled" at the lack of native-born silviculturalists in this country.

Fred McDougall, deputy minister of renewable resources in Alberta Energy and Natural Resources, is even more cautious. In October, 1983, McDougall voiced his own strong concerns about the future of our forests and forest industries during a speech to the annual meeting of the Canadian Institute of Foresters in Sault Ste Marie, Ont.

"They are steps forward," he says of the recent developments, "but we're not there yet by any means." Of education and research he says, "there is more to be done in both those areas." McDougall adds, however, that in his opinion the situation here in Alberta is more encouraging than in many other provinces.

Scot Morison is an Edmonton freelance writer.

A.E. News

Twin Butte study

The Twin Butte soils and water evaluation task force has concluded a year-long investigation relating to the Gulf Pincher Creek and Shell Waterton sour gas plants. The seven-member task force was appointed by the environment minister in April, 1983. Its objectives were to determine what substances are on the plant sites as a result of plant operations and whether any substances have "migrated" off the sites.

Gulf recently phased out its Pincher Creek operation. While decommissioning the plant the company found toxic metals in wastewater and surface runoff collection ponds. The 25-year old plant was the first major sour gas plant built and the first to close in Alberta.

The task force researched surface and groundwater contamination, metals and sulphur isotopes in soils, vegetation and sediment and gaseous and particulate emissions. Studies were done in areas surrounding the two plants and the rural areas of Glenwood, Hill Spring and Twin Butte. Two public meetings were held in Pincher Creek during the year.

General conclusions in the task force report are that there are toxic materials on the Gulf plant site but no evidence that heavy metals or toxic substances in substantive quantity have migrated from the sites.

The task force made 16 recommendations, many of them for more monitoring and studies in the area. One recommendation was that Gulf proceed with its proposed reclamation and that reclamation guidelines be established for future plant decommissionings. Another was for better communications between sour gas plants and neighboring communities.

Chairman of the task force was Hilton Pharis, a rancher and reeve. For more information contact Jim Armet — 427-2391.

Enforcement

Representatives of about 30 member groups of the Alberta Environmental Network met Nov. 16 and 17 with Environment Minister Fred Bradley and senior department officials to discuss enforcement of the province's environmental protection standards.

During the workshop, Bob Briggs, director of the pollution control division, released a summary of the department's monitoring and enforcement program.

According to the summary there have been 96 prosecutions for environmental offenses since the department began monitoring Alberta industry in 1972. Most of the charges were related to failure to obtain a permit to construct or an operating licence. Of the charges, 53 resulted in convictions, 13 were dismissed by the courts and the remainder were withdrawn. Convicted companies were commonly fined between $50 and $100.

The summary describes a series of enforcement measures used by the department. New projects must obtain a permit to construct and a licence to operate, both setting out terms and conditions for pollution control. Companies are required to submit monthly and annual reports on monitoring data to pollution control division. They must immediately report uncontrolled or excessive emissions and all violations are followed up.

Many violations of licensed or guidelines limits are corrected through discussions between the company and the department. From July 1, 1983 to June 30, 1984 the department held 600 such discussions with 428 operations in the province.

If there is a risk to human health or the environment, the director may issue a legal document called a control order which orders a company to take certain steps. In extreme cases, he can shut down operations at a plant (stop order) or recommend to the Attorney-General that charges be laid. Details about directives and orders are given in the summary report.

How successful has the program been? From 1978 to 1983 Alberta industry spent more than $343 million on air pollution control equipment. Annual operating costs are estimated at $85 million. Based on monitoring data submitted by industry the summary concludes that industry complies with environmental protection Acts, regulations, guidelines, objectives, licence and other requirements nearly 98 percent of the time.

For more information about enforcement contact Bob Briggs at 427-6270

Water quality

Although still "heavily loaded" below Edmonton, the North Saskatchewan River has improved greatly over the last three decades, says a report prepared for the department by Pat Bouthillier, a University of Alberta civil engineering professor.

Stream pollution control in Alberta began as a one-man operation in 1949. Other

Prepared by Doug Ramsay

Using Environment Views in the Classroom

"The threat is not simply an environmental problem; loss of forest resources will have social and political implications the world over."

The secondary curriculum contains little specifically dealing with forestry. It is, however, becoming a topic of increasing importance, as the articles in this issue of *Environment Views* point out. Therefore teachers should become more aware of this and use forestry topics in the classroom. These topics are primarily for science students with some broader concerns of interest in social studies classrooms. Most important for teachers is giving students the awareness they need to understand the complex concerns of the forest industry and the environmental ramifications which could effect Alberta in the future.

Relationship to Curriculum: *Social Studies*

While it would be unreasonable to suggest forestry could be a major focus of any unit in social studies, it could be included as part of at least two units in the curriculum.

Social Studies 9, Topic C. Industrialization in Canada

- Should long-term environmental concerns determine how much of Canadian forests may be used by industry today?

Social Studies 20, Topic B, Global Problems of Population and Resource Distribution

- Should Third World forests be utilized today to improve the short-term economies of those countries?

Science

Forestry provides a number of interesting topics for general sciences, biology and chemistry at the high school level. The following are a number of topics which could form the basis of student topics (in biology and chemistry) and optional units (in Science II).

General Topics

- Reforestation: who is responsible?
- The environmental impact of deforestation
- Agriculture vs. forestry: causes of conflict; solutions.
- Advancements in technology: a help or hindrance to forestry?
- Role of herbicides: creating a larger problem?
- Forestry research: pros and cons

Specific Topics

- History of the development of the forest industry
- How important is the forestry industry to Alberta?
- How can the problems of deforestation be solved?
- What are the various types of forests in Alberta and what economic importance do they have?
- What is the relationship between wildlife and the forests?
- How can "better trees" be grown?

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milestones: 1951 — the first report on the river notes visible pollution; 1950s — the Provincial Board of Health ordered the City of Edmonton and industries to meet waste treatment requirements; 1956 — dissolved oxygen levels downstream of Edmonton reached zero (septic conditions). A compressor was used to inject air into the river through a pipe on the river bottom but with little effect. 1967 — the Department of Health established water quality criteria; early 1970s — Alberta Environment began issuing permits and operating licences specifying pollution control measures.

The report attributes improved water quality to better treatment of sewage and industrial effluents and greater river flow in winter as a result of the Bighorn and Brazeau dams.

For more information call Akio Masuda, water quality control branch — 427-5828.

Exchange announced

The first prairie recycling conference drew about 200 people to the Edmonton Convention Centre Nov. 5 and 6. The event was sponsored by Alberta Environment.

In his opening address, Environment Minister Fred Bradley reviewed the achievements of his department's recycling program. He also announced the formation of a waste materials exchange funded by the department. The exchange, he said, would be a forum for industries to exchange confidential information about their wastes.

The Alberta Research Council is on contract with Alberta Environment to establish and operate the exchange, which will be similar to exchanges in Ontario, British Columbia and the U.S.

The Canadian Waste Materials Exchange (CWME) in Ontario, for example, has provided free services to generators and users of waste since 1978. In its April bulletin, the CWME lists more than 5,000 items for exchange and wastes wanted.

An introductory letter outlining the proposed services of the Alberta Waste Materials Exchange will be sent out soon. Anyone who wants to receive this information should contact the AWME, Terrace Plaza, 4445 Calgary Trail South, 4th Flr., Edmonton T6H 5R7 (tel: 438-1555).

ADM appointed

Carl L. Primus has been appointed assistant deputy minister of Alberta Environment's environmental protection services, effective Nov. 13.

Mr. Primus was born in Alix, Alberta and graduated from the University of Alberta in 1967 with a B.Sc. in geography.

He began his employment with the province in the water resources division of the Department of Agriculture. In 1971 he transferred to the newly-created Department of Environment with the water resources planning division.

He was appointed director, planning division in 1977 and held this position until his current appointment.

Environmental protection services consists of four divisions: pollution control, standards and approvals, earth sciences and research management, responsible for standards, monitoring, enforcement and applied research.

News from the Centre

Dr. Subramanian Ramamoorthy, a scientist at the Alberta Environmental Centre in Vegreville, has been awarded the degree of Doctor of Science by the University of Madras, India, for research contributing significantly to scientific knowledge. He earned the degree for interdisciplinary research on heavy metals in the environment, a field he has studied since receiving his Ph.D. in 1968.

Dr. Ramamoorthy and Dr. Jim Moore have had a second book published by Springer-Verlag of New York. *Organic Chemicals in Natural Waters: Applied Monitoring and Impact Assessment* is a companion to the volume on heavy metals in natural waters published in 1984.

AE News is a new feature of *Environment Views,* highlighting news from Alberta Environment. Anyone with items of general interest about Alberta Environment projects, achievements, staff changes, etc. should contact the communications branch, 12th floor, Oxbridge Place, 427-6267.

If undelivered, return to:

Environment Views
Alberta Environment
9820 - 106 Street
Edmonton, Alberta T5K 2J6

Environment Update

Pesticide courses

Several courses are being offered for pesticide applicators in the new year: *Lakeland College Home Study Course* is a preparation for Environment's pesticide applicator licensing examination. It examines pesticide legislation, safety and pest control.

Practical training sessions emphasize problem identification, pesticide selection and equipment calibration for: landscape, greenhouse and agricultural pest control; aquatic and industrial vegetation management; and mosquito control are planned for Edmonton and a two-day seminar in aerial application for Red Deer.

For more information contact Janet McLean-Mueller — 427-5855.

Toxicity Symposium

The Second International Symposium on Toxicity Testing Using Bacteria is scheduled for the Banff Centre from May 6 to 10, 1985. Scientists from over 20 countries will be discussing technical aspects of using micro organisms for toxicity assessment. The Alberta Environmental Centre in Vegreville is one of the symposium sponsors.

Environment Manpower

The Environment Employment Program, which began Nov. 1, administered by Alberta Manpower, supports labor-intensive environmental activities such as erosion or infestation control, shoreline and beach restoration, fire hazard reduction, tree planting, land reclamation and habitat improvement.

Eligible projects must provide at least three full-time jobs lasting from six weeks to one year. Possible employers are non-profit organizations, municipalities and Metis and Indian bands.

For more information call Special Manpower Programs, 427-4740, Edmonton. Outside Edmonton call toll-free — dial 0 and ask the operator for Zenith 22078. Application forms can be picked up from any Manpower office.

The Economics of Environmental Decisions

The Alberta Chapter of the Canadian Society of Environmental Biologists will be holding its 1985 symposium on the topic *The Economics of Environmental Protection;* Feb. 19 and 20 at the University of Alberta.

This conference will provide biologists with some knowledge and appreciation of the economic arguments which underlie many of the decisions made about environmental protection, but the topic should also be of interest to resource economists, geographers, and planners.

Garrett Hardin, the author of *The Tragedy of the Commons,* will be a guest speaker. Other speakers will include Bill Yurko, Alberta's first environment minister, and the Hon. Charles Caccia, former federal environment minister, now the opposition environment critic.

For further registration information, contact Brian Free at (403) 427-5792, or write to the Alberta Chapter, C.S.E.B., Box 12, Substation 11, Edmonton, Alberta. T6G 2E0.

Indoor Air Quality

An Air Pollution Control Association specialty conference entitled *Indoor Air Quality in Cold Climates: Hazards and Abatement Measures* will be held in Ottawa Apr. 29, 30 and May 1. A call has been issued for papers which identify health hazards and pollutant sources, or measures to control pollutant levels through building design, systems and component selection and operation.

For further information contact Douglas Walkinshaw, National Research Council of Canada, Ottawa, 613-993-8232.

Environmental Law Centre

The Environmental Law Centre in conjunction with the Faculty of Continuing Education, University of Calgary, is offering a series of informal seminars in environmental law. The topics to be discussed include: access to information, civil actions, prosecutions, environmental evidence and hearings and inquiries.

The seminars will be held at the University of Calgary campus every Tuesday evening beginning January 29 to February 26, from 7:15 p.m. - 9:30 p.m. The program is open to the general public and the fee is $25.

To register, contact the Faculty of Continuing Education, University of Calgary.

In conjunction with the Saturday Morning at the Law School Program, the Environmental Law Centre is offering an informal seminar in Environmental Law and the Right to Clean Water. The program will be held at the Law Centre, University of Alberta on Mar. 30, from 9:30 a.m. - 12:30 p.m. The public is invited to attend at no charge and pre-registration is not required.

For further information contact the Environmental Law Centre at 425-6740.

If you have a short news item of province-wide interest you'd like to contribute to Environment Update, please send it to the editor at the address on the Contents page. The editor reserves the right to select and edit the items.